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This series of three guides was developed by 25 participants in the institute. One hundred and eight industrial arts lesson plans for grades K-6 are included in these guides for construction and for manufacturing intended to reflect the contemporary industrial and technological society in which young children live. Some typical construction lessons are: (1) Man and Technology, (2) Selecting a Site, (3) Listing Materials, (4) Clearing the Site and Getting Ready to Build, (5) Erecting Steel Frames, (6) Mediation, Arbitration, and Striking, and (7) Maintaining Property. Some typical manufacturing lessons are (1) Manufacturing and the Economic System, (2) Identifying Consumer Demand, (3) Designing Power Elements, (4) Operating Quality Control Systems, (5) Establishing Accident Prevention Programs, (6) Hot and Cold Working Processes, and (7) Servicing Manufactured Products. Each lesson includes objectives, activities, teaching procedure, relationships to other subjects, materials required, and a bibliography. (EM)

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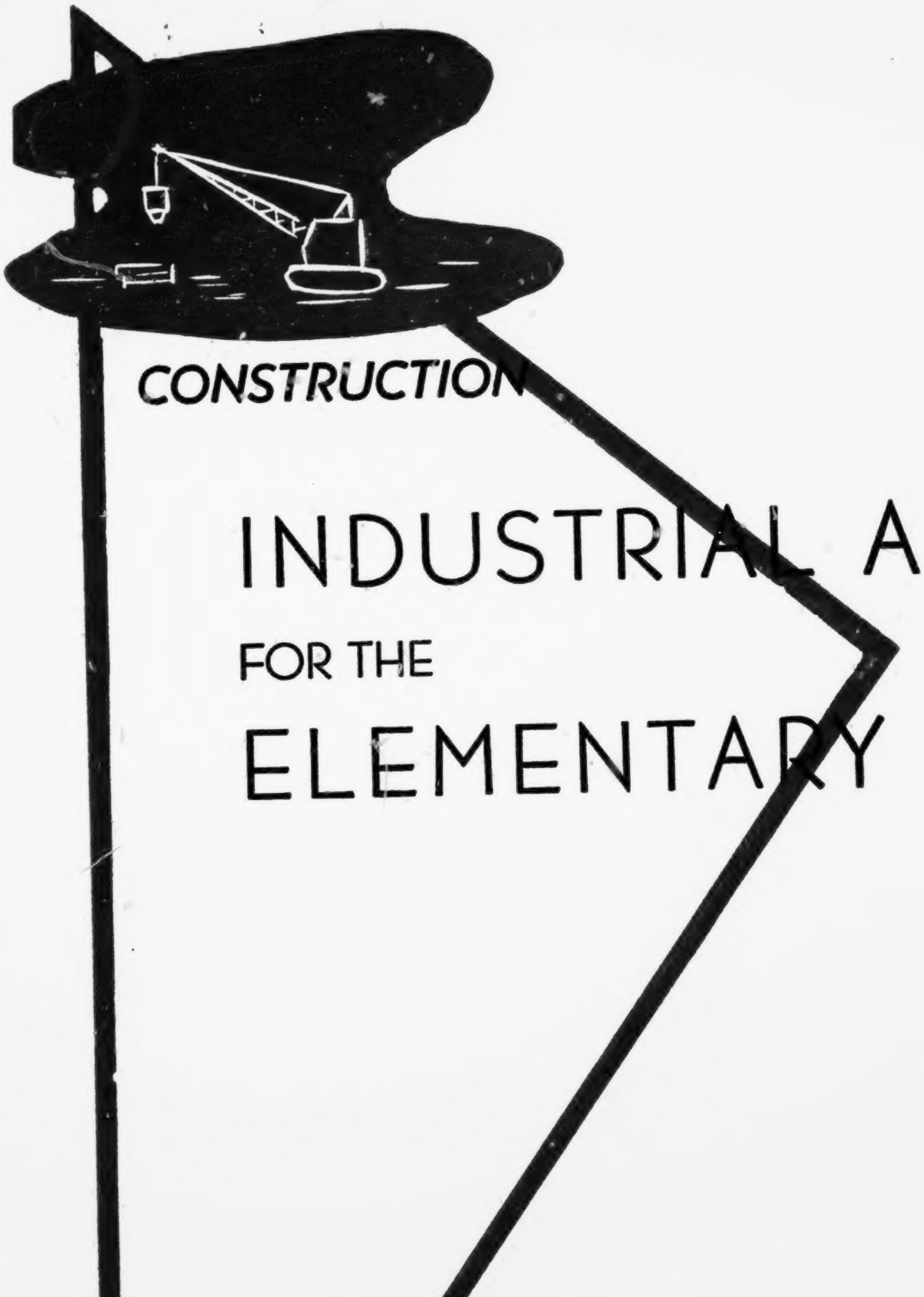
CONSTRUCTION
MANUFACTURING

INDUSTRIAL ARTS FOR THE ELEMENTARY SCHOOL

5-6

NDEA Institute for
Advanced Study
The Ohio State University
1968

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Guides
in
CONSTRUCTION AND MANUFACTURING
for
Elementary School Industrial Arts . 5-6.

Summer 1968

10 # Materials developed at

NDEA Inst~~itute~~ for Advanced Study
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The Ohio State Univ~~ersity~~
Columbus, ~~Ohio~~
43210

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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INTRODUCTION

This institute was specifically designed to strengthen the participants' qualifications as classroom teachers, supervisors, and teacher educators with special reference to the areas of industry and technology at the elementary school level. The program of study and the practicum experiences were designed to strengthen the participants' philosophical orientation; provide an awareness of new approaches techniques, and skills; and demonstrate effective means of developing curriculum materials for elementary school pupils.

The overriding objective of the institute was to effect curriculum change in the industrial arts offerings of the elementary school. The specific objectives were: 1) to help participants increase their knowledge of industry and technology, with special emphasis on those local industries that influence childrens' everyday living; 2) to assist participants in projecting a rationale for the inclusion of industrial arts in the elementary curriculum; 3) to help participants increase their skills in writing curriculum materials and developing laboratory experience for pupils at the elementary school level; 4) to provide practicum experience through teaching selected units to pupils in an elementary school setting; and 5) to help participants gain knowledge of the rich instructional resources available from industry in the community.

One unique feature of the institute was the inclusion of classroom elementary teachers, industrial arts teachers, industrial arts supervisors, and industrial arts teacher educators. They worked together as colleagues in the institute and profited from the interaction that occured because of their difference in perspective. A second unique feature was the practicum experience with a demonstration class of elementary school pupils. Realistic classroom situations helped to ensure valid methodology and content selection.

Leaders in the profession through the AIAA, the affiliated ACESIA, and other professional organizations have long recognized the need to develop meaningful programs for elementary schools that reflect the contemporary industrial and technological society in which young children live. This institute helped to further the renewed interest that has been shown in elementary industrial arts. Extended effort is required if industrial arts activities are to find their appropriate place in a well-balanced elementary school program.

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PREFACE

These guides for the elementary grades K-6 were developed by the twenty-five participants under the guidance of a staff of specialists in industrial arts. Each of the booklets was developed and organized by grade levels K-2; 3-4; 5-6 and encompassed material listed under the headings of construction and manufacturing. Each participant was responsible for the development of a share of the lessons, when totaled amounted to seventy-two in all. Each participant as nearly as possible developed guides in his major area of interest and on the grade level of his choice.

The general approach used by each group was common and was based on lectures by staff and visiting lecturers, group discussions and the experiences that were a result of working with the elementary students at the University School.

These guides are in no way intended to limit the teacher's class activities but rather to serve as a direction or approach to aid in the development of other guides to meet the needs of the classroom situation. It is hoped that these experiences will spark the imagination of the teachers so that they will attempt new and better ways of interpreting industry to the elementary school students. In the case of administrators it is hoped that they will provide their own staff the opportunity to implement a program in elementary school industrial arts and encourage the staff to do so. The teacher educators have increased their base on which to interpret the vast systems of construction and manufacturing to future teachers.

Victor W. Hoffman, Director
NDEA Institute for Advanced
Study in Elementary Industrial
Arts. Summer 1968

5-6

Other Instructional Materials

In This Series

K-2
3-4

CONSTRUCTION

CONSTRUCTION

Assignment: 1 Grade Level: 5-6

Title: Man and Technology

Definition: Technology is the record of man's achievements in materials, techniques and skills and is the means by which man efficiently produces the goods to meet his needs.

Objectives: As a result of the learning experiences the students should be able to identify two sub elements of technology: a) as the means by which man uses goods efficiently, b) as the means by which man changes material to meet his needs.

Activities:

1. To devise a chart that illustrates things which were modified through man's use of technology and things which have modified man.
2. Devise a time chart of 'World Development'.
3. Chart and Report.
   'The beginning of Education'
   'The beginning of Religion'
   'The beginning of Agriculture'
   'The beginning of Government'
   'The beginning of an Economic System'
4. Compare man's progress 'then and now'.
5. Chart and report the Basic Societal Institutions.

Teaching Procedure:

1. Section the class into committees of three to be responsible for an area.
2. After researching, they should decide which events should be included on the time chart.
3. After final analysis and approval of the teaching, the group will plot their particular events on the time chart.

Relationships:

1. Social Studies: History related to the revolution of technology.
2. Mathematics: Measuring distances on time chart.
3. Language Arts: Ability to express themselves in charts and reports.
4. Art: Skill in devising charts.

Tools and Materials:

Paper, pencils, chart paper, ruler, magic markers, chalk.

Bibliography:

Olson, Delmar W., Industrial Arts and Technology, Prentice-Hall, Inc., Englewood, Cliffs, New Jersey, 1963.

Bennett, Edward, Degan, James, and Spiegel, Joseph, Human Factors in Technology, McGraw Hill Book Company, Inc., New York, 1963.

CONSTRUCTION

Assignment: 2 Grade Level: 5-6

Title: Construction Technology

Definition: Construction technology is the knowledge of how to use tools and techniques to build an object.

Objectives: As a result of the learning experiences the students should be able to recognize the growth of construction technology through the history of the world in the use of tools, and techniques used in construction.

Activities:

1. Research the first things man constructed in a shelter, church, pyramids, bridge, boat.
2. Report this research in the form of a (choose one) chart, notebook, models, serials, mural.
3. List in the form of a chart the things we use that are the result of construction.
4. Illustrate the kinds of construction that they might see in the future.
5. Make models of types of tools used in the beginning of civilization.

Teaching Procedure:

1. Study with the children the earliest type tools used. Many library references should be provided in the classroom and encourage the children to read them.
2. Allow the children freedom to choose the tool they wish to make.
3. Have the children design and plan the tool, deciding which materials they will use, the appearance of the objects they plan.
4. Let the children construct the tool from their plan with any needed assistance from the teacher.

Relationships:

1. Mathematics: Estimating cost of material, study of fractions. . .
2. Social Studies: Study of the relationship of technology to culture.
3. Art: Ability to make charts. Drawing and designing.
4. Language Arts: Learning new terminology.

Tools and Materials:

Chart paper, wide variety of art materials, such as charcoal, ruler, india ink, art paper, magic markers, materials to build models.

Bibliography:

The Wilkie Foundation, Teching Charts - Revolution of Tools, and the Economics of Tools, Des Plains, Illinois.

Olson, Delmar W., Industrial Arts and Technology, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1963.

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Co., Publishers, Dubuque, Iowa, 1966.

CONSTRUCTION

Assignment: 3 Grade Level: 5-6

Title: Applying Technology to People

Definition: Technology has elevated man by allowing him to create his own environment, control natural forces and achieve freedom from enslavement.

Objectives: As a result of the learning experiences the students should be able to discuss and report five ways by which technology has elevated man as well as the construction worker; list two methods of creating an environment; list six ways of controlling natural forces.

Activities:

1. Study and report ways in which technology has elevated man as it relates to construction.
2. Create dioramas depicting different construction techniques for different periods.
3. Study and discuss the history of the labor unions.
4. Divide the class into two sections, one to represent the employer and the other employee. Have these two groups organize a simple debate on the question of balance of power.

Teaching Procedure:

1. Explain and illustrate a diorama.
2. Let the children discuss and decide what type of container would be best - cardboard box, wooden box, etc..
3. Continue by letting the children discuss where materials could be found, what size and dimension would be best, how the figures and background could be attached, etc..
4. After the technical problems have been somewhat solved, let each child create his own diorama.
5. Arrange for some sort of recognition for the class by setting up a display either for the school or parents.

Relationships:

1. Social Studies: Relationship of labor and management to everyday living.
2. Art: Skill in preparaing scale model figures.
3. Mathematics: Converting whole numbers into fractions.
4. Language Arts: Skill in learning how to organize a debate.

Tools and Materials:

Art and craft material for making dioramas.

Bibliography:

Ohlsen, Merle M., Modern Methods in Elementary Education, Holt, Rinehart and Winston, New York, 1959.

Newkirk, Louis V., Integrated Handwork for Elementary Schools, Silver Burdett Co., New York, Chicago, Boston, San Francisco, 1940.

CONSTRUCTION

Assignment: 4 Grade Level: 5-6

Title: Managing Technology

Definition: Managing technology is the systematic consideration and practical application of concepts and objectives to accomplish specific industrial goals that may be stated in terms of performance..

Objectives: As a result of the learning experiences the students should be able to correctly discuss purposes served by a simple relief maps.

Activities:

1. Make a relief area of sand.
2. Sketch a similar area on a chalkboard.
3. Measure relief distances of a model.

Teaching Procedure:

1. The teacher will sketch a sectional drawing of a hill on a chalkboard. Pupils will be asked to draw a somewhat similar sectional hill.
2. The same relief features would then be duplicated by the teacher on a sand table or in a sand tray.
3. Have pupils measure the levels of relief. Instruct pupils to show this by connecting points on their drawings that are of the same "elevation".

Relationships:

1. Geography: Map making, reading.
2. Mathematics: Scale of feet to inches.

Tools and Materials:

Chalkboard, drawing paper, No. 3 pencils, sand table, 12" ruler.

Bibliography:

Florida State Department of Education, A Guide - Industrial Arts in Florida Schools, 1959, Chapter 3.

CONSTRUCTION

Assignment: 5 Grade Level:5-6

Title: Beginning the Project

Definition: Beginning the project is the initiation of any or all of the component legal and material units that will be combined to form the completed project.

Objectives: As a result of the learning experiences the students should be able to shape pieces of wire screening to conform to the relief features a simple contour map. The map to be used as a guide for shaping the screen would be one prepared by members of the class.

Activities:

1. Re-define map.
2. Group, committee work.
3. Shaping screen, using hand tools.

Teaching Procedure:

1. The teacher would review the dimension features of the contour map that is to be used as a guide. Each pupil would have a copy of this contour map.
2. Pupils would assemble in groups of four or five about tables for construction.
3. Cooperatively, each group would use the simple tools and the materials provided to shape the relief map features.

Relationships:

1. Geography: Contour map reading.
2. Language Arts: Written sequence of directions to follow.
3. Science: Causes of topography.

Tools and Materials:

Wire screen, tin snips, thumb tacks, pencil, relief map.

Bibliography:

Larson, Delmar L., and Nelson, Herbert L., Elementary School Industrial Arts, University Printing, Department of Industrial Education, Eastern Michigan University, Ypsilanti, Michigan, 1968, p. 92.

CONSTRUCTION

Assignment: 6 Grade Level: 5-6

Title: Selecting a Site

Definition: Selecting a site is making a decision to use a geographic area for a structure.

Objectives: As a result of the learning experiences the students should be able to draw a backdrop behind a 3-D relief map model.

Activities:

1. Discuss the proportion in the drawing.
2. Cutting, bending cardboard.
3. Tempera painting.

Teaching Procedure:

1. The teacher would tell pupils that a colorful backdrop would improve the display value of the relief map model.
2. Simple backdrop design and construction techniques would be demonstrated. The importance of distance and the extension of features would be discussed

Relationships:

1. Fine Arts: Proportion in drawing, depth.
2. Geography: Attention to extending the natural land features.
3. Guidance: Pupils would evaluate their own work.

Tools and Materials:

Kraft paper, tagboard, scissors, pencils, tempera paint, colored chalk.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Company, Dubuque, Iowa, 1966, p. 16.

CONSTRUCTION

Assignment: 7 Grade Level: 5-6

Title: Surveying and Mapping and Soil Testing

Definition: Surveying is to study a land site to determine boundaries, elevations, depressions and other factors that might affect or aid in the land usage.

Soil Testing is the performing of various tests that might indicate some affect on how the land is to be used.

Objectives: As a result of the learning experiences the students should be able to recall that surveys and maps of proposed structure site and that soil tests are made to determine suitability; identify processes and instruments used in surveying, mapping and soil testing; plan and layout measurements for a construction project.

Activities:

1. Examine equipment used for surveying, mapping and soil testing.
2. Plan and perform surveying of a construction project.

Teaching Procedure:

1. Discuss importance of any or all of the following:
   a. Field trip to construction sites.
   b. Examine pictures and drawings.
   c. Relate past experiences.
2. Examine surveying and mapping instruments.
3. Invite construction engineer to discuss topic.
4. Make a survey drawing and map for one of the following:
   a. Playground equipment shed.
   b. Bird bath.
   c. Planter
   d. Sidewalk
   e. Playground area to be blacktopped.

Relationships:

1. Mathematics: Measurements.
2. Social Studies: Industries, community living.

Tools and Materials:

Surveying and mapping instruments and pictures, construction drawings, measuring tapes, rulers, drawing paper.

Bibliography:

----------------, How-To-Do-It-Encyclopedia, Golden Press, New York, 1958, Volume 8, p. 190.

CONSTRUCTION

Assignment: 8 Grade Level: 5-6

Title: Designing the Construction Project

Definition: Designing is finding a solution to a problem through identifying the problem, developing preliminary ideas, analyzing possible solutions and deciding upon a solution to be implemented.

Objectives: As a result of the learning experiences the students should be able to define the process of making a design; to make a design of a structure to be made on the school grounds.

Activities:

1. Discussion of a structure to be made for the school.
2. Discuss how a design is planned.
3. Plan and design a structure for the school.

Teaching Procedure:

1. Discuss what a design is and how the final design is derived after different approaches, analysis and refinements are made.
2. Select and plan a design of some structure that could be made at school.
3. Make a three view drawing of the structure.

Relationships:

1. Language Arts: Art of discussion and organizing.
2. Mathematics: Measuring.
3. Art: Sketching and drawing the plans.

Tools and Materials:

Graph paper and rule.

Bibliography:

Townsend, Gilbert and Dalzell, J. Ralph, How to Plan a House, American Technical Society, Chicago, 1958, pp. 102-137.

CONSTRUCTION

Assignment: 9 Grade Level: 5-6

Title: Steps in Designing and Engineering a Construction Project

Definition: The steps in designing with an understanding of the type of structure to be designed, requires preliminary drawings, each showing a different approach, analyzed to consider aesthetic and practical applications, and then refined for selection.

Objectives: As a result of the learning experiences the students should be able to define the steps of designing a structure; design a structure that could be made at school; make three view drawing of the design; and build a structure according to the design drawings.

Activities:

1. Discuss the steps and decide on a structure to design.
2. Design a structure.
3. Make a three view drawing.
4. Build a structure on the school grounds.

Teaching Procedure:

1. Discuss the steps of design. Point out the sequence of any constructed work such as a house, tunnel, dam, bridge.
2. Demonstrate a design of a structure that is decided useful and possible to build at school. Example: playground equipment shed, bird bath, planter, sidewalk to play area, play are to be blacktopped.
3. Have the class make a design and decide on the best.
4. Make three view drawings (front, side, top) of structure.
5. Build the structure according to the design.

Relationships:

1. Mathematics: Measurements.
2. Language Arts: Discussion.

Tools and Materials:

Graph paper, rulers, measuring tapes, building materials for structure.

Bibliography:

Townsend, Gilbert and Dalzell, J. Ralph, How To Plan A House, American Technical Society, Chicago, 1958, pp. 102-137.

CONSTRUCTION

Assignment: 10 Grade Level: 5-6

Title: Working Drawings and Specifications

Definition: Working drawings are these which give all the information necessary to construct an object. Specifications are information which tell exactly how an object is to be made.

Objectives: As a result of the learning experiences the students should be able to make a simple three view working drawing, and write basic specifications of the design he has selected for construction.

Activities:

1. Using coordinate graph paper sketch a three view working drawing showing how the object to be constructed will appear.
2. On the same paper as the drawing, write specifications telling the measurements of the object, and how it will be fastened together.

Teaching Procedure:

1. Show students samples of simple working drawings and specifications.
2. Illustrate on chalkboard or overhead projector the procedure for making a three-view working drawing.
3. Show how to write simple dimension notes and specifications.
4. Give students a format to use when writing specifications.

Relationships:

1. Mathematics: Measurement, proportion, simple geometry.
2. English: Sentence structure and grammar in specification writing.

Tools and Materials:

Coordinate graph paper
Pencil, eraser
12" rule

Bibliography:

Elementary drafting textbooks.

CONSTRUCTION

Assignment: 11 Grade Level: 5-6

Title: Contracting

Definition: Contracting is the making of an agreement, usually written, between the builder and the buyer.

Objectives: As a result of the learning experiences the students should be able to write a simple construction contract; and identify three parts of a contract.

Activities:

Role playing in pairs, one student acting as contractor and another as buyer. Each pair of students enters into a contract where one agrees to construct some simple object for the other, and do so for a specified cost and in a specified time period. Together they write a contract and each signs it with the teacher also signing as a witness.

Teaching Procedure:

1. Expand upon the definition and discuss the use of contracts in the construction industry.
2. Identify the basic parts of a contract.
3. Devide the class into pairs for role playing and give them the assignment of writing a construction contract.
4. Review the contracts written by students, and if approved sign them as a witness.
5. This activity may be followed up by actually allowing the students to fulfil the contract by constructing the object.

Relationships:

1. Social Studies: Economics involved in making contracts.
2. English: Sentence structure and grammar.

Tools and Materials:

Sample construction contracts, pencil and paper.

Bibliography:

Townsend, Gilbert, and Dalzell, J. Ralph, How To Plan A House, Chicago, American Technical Society, 1961.

CONSTRUCTION

Assignment: 12 Grade Level: 5-6

Title: Estimating and Bidding

Definition: Estimating and bidding is forming a judgement concerning the cost required to construct some object, and quoting this cost to a prospective buyer.

Objectives: As a result of the learning experiences the students should be able to make a written listing of the materials and cost required to construct a model house and submit the total cost of all materials as a construction bid.

Activities:

1. From a simple drawing, make a written listing of the materials required to construct a model house in the classroom using three-eighth inch thick plywood.
2. List each piece of plywood needed, giving its size in square inches, and the cost of the piece.
3. Total the cost of all pieces of material and submit this figure as a bid using a figure of five square inches for one(1) cent.

Teaching Procedure:

1. Expand upon the definition.
2. Discuss the use of estimating and bidding in the construction industry.
3. Give the students a dimensioned drawings of a simple model house.
4. Show examples of three-eighth inch plywood and discuss its price.
5. Give the students a format. for figuring the list of materials and cost.
6. Have the students submit their total figures as a bid for construction.

Relationships:

1. Mathematics: Area measurement and cost estimating.
2. Social Studies: Economics of estimating and bidding.

Tools and Materials:

Dimensioned drawing of model house, examples of three-eighth inch plywood, pencil and paper.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Co., New York, 1959.

CONSTRUCTION

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2. Discuss the use of estimating and bidding in the construction industry.
3. Give the students a dimensioned drawings of a simple model house.
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5. Give the students a format. for figuring the list of materials and cost.
6. Have the students submit their total figures as a bid for construction.

Relationships:

1. Mathematics: Area measurement and cost estimating.
2. Social Studies: Economics of estimating and bidding.

Tools and Materials:

Dimensioned drawing of model house, examples of three-eighth inch plywood, pencil and paper.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Co., New York, 1959.

CONSTRUCTION

Assignment: 13 Grade Level: 5-6

Title: Collective Bargaining, Handling Grievances

Definition: Collective bargaining is the negotiation for the settlement of hours, wages, etc. between employer and an organized body of workers. Handling grievances is a method of negotiating difference between employers and employees.

Objectives: As a result of the learning experiences the student should be able to explain the need for collective bargaining procedures between a large U.S. corporation and a union; explain how personnel grievances are processed; identify the relationship between collective bargaining and handling grievances; state why each side should understand the issues and needs of the other.

Activities:

1. Set up a role playing activity with students representing the employer and workers and draw up a new contract for hours and wages using collective bargaining procedures.
2. Use roleplaying to resolve a student grievance.

Teaching Procedure:

1. The teacher would set up a role playing activity with 3 or 4 students taking the part of management and 3 or 4 students taking the part of the workers.
2. The teacher would then set up a set of working conditions for each including hours and wages.
3. The two sides would then negotiate until a compromise was reached.

Relationships:

Social Studies: This could have a direct relationship with social studies when studying a unit about unionism, industrial revolution, or current events.

Tools and Materials:

None needed.

Bibliography:

World Book Encyclopedia, Field Enterprises Ed. Corp., Chicago, Illinois, 1965, Volume L, pp. 2-17.

Scott, William G., The Management of Conflict: Appeal Systems in Conflict, Homewood, Illinois, 1965, p. 129

Van Mol, Louis, Effective Procedures for the Handling of Employee Grievances, Public Personnel Association, 1961, p. 25.

CONSTRUCTION

Assignment: 14 Grade Level: 5-6

Title: Hiring Construction Personnel, Training and Educating for Construction, Working Conditions, Advancing in Construction.

Definition: The hiring of qulified people to do construction work. The training and educating these people to perform their tasks in a desireable manner under adequate present day working conditions so they can move up the "ladder of success."

Objectives: As a result of the learning experiences the students should be able to evaluate three good hiring practice in a trade, management, and engineering fields; identify and describe three items necessary for training or educating a person to perform adequately in a trade, management, or an engineering field; identify three common working conditions: (social, economic, and physical.); discuss three relationships between competency in one's job and subsequent advancement.

Activities:

1. Role playing with students recruiting for an opening in management, a trade, and an engineer.
2. Role playing with students setting up conditions for advancing in management or a trade in a community building project, such as building toys for a local orphanage.
3. Role playing activity with the students publishing their own news magazine and arranging their own working conditions with the following items to be considered: hours, amount of work to e done daily, physical set-up of room where work is to be done.

Teaching Procedure:

1. Students are given assignment to bring to class newspaper clippings from help wanted ads for certain trade openings, management positions, and selected engineering fields.
2. Class to discuss job positions, training and education required to fill the positions, working conditions of each, and possibility and ways of advancing in each.

Relationships:

1. Social Studies: Learning how people are hired and how a person can advance in his occupation.
2. Reading: Learning what goes into the printing and publishing of a book, magazine, or newspaper.

Bibliography:

Halsey, Coyne and Shores, Ment Students Encyclopedia, Crowell-Collier Educational Corporation, 1967, pp. 89, 474-479.

Cohen, B., Working Conditions and Employee Services, Institute of Labor and Management, 1945, p. 87.

CONSTRUCTION

Assignment: 15 Grade Level: 5-6

Title: Construction Production Technology

Definition: Construction production technology is the changing of the form of material through combining, forming, and separating them on the site.

Objectives: As a result of the learning experiences the students should be able to identify at least three ways your man-made surroundings are produced on a construction site; identify at least three examples of each 1) pre-processing 2) processing, and 3) post processing; define: 1) pre-processing of materials, 2) processing of materials, and 3) post processing of materials; explain what is meant by: changing the form of materials through combining, forming, and separating them on the site.

Activities:

1. Build a bird bath using concrete.
2. Cut out cardboard to make a Valentine box.
3. Make a figure design out of tooth picks.

Teaching Procedure:

1. Layout the stretch-out of the box.
2. Cut out the pattern with scissors.
3. Fole on lines.
4. Tape or glue together.
5. Choose appropriate decoration and put on the box as desired.
6. Cut out opening at top for card slot.

Relationships:

1. Art: Learning about design procedures, the coloring wheel.
2. Social Studies: Learning about processing and how it relates to construction throughout the world.
3. Science: Learning about the habitat of animals such as birds.

Tools and Materials:

Scissors, crayons, masking tape, glue, scotch or brown tape.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Co., Milwaukee, 1959, pp. 99-104.

Moore, Hamburger and Kingzett, Handcrafts for Elementary Schools, D. C. Heath and Company, Boston, 1953.

CONSTRUCTION

Assignment: 16 Grade Level: 5-6

Title: Clearing the Site and Getting Ready to Build.

Definition: Is that process whereby the removal of trees, stones, excess dirt, is accomplished by the use of earth digging machines and other tools relating to this operation.

Objectives: As a result of the learning experiences the students should be able to have experience in clearing a site and to develop aesthetic appreciation.

Activities:

1. The students are to plan a beautification project on the school grounds. Select committees and organize work schedules.
2. Construct a model village out of balsa wood and clay.
3. Collect and display models of equipment used in construction sites today.

Teaching Procedure:

1. All students will develop a workable plan for remodeling the school yard.
2. After a plan is accepted have students list their job assignments.
3. Obtain trees or shrubs by soliciting local greenhouses.
4. With approval of administration begin this operation.

Relationships:

1. Mathematics: Measure off proper distances between plantings.
2. Reading: Look up various types of shrubs and study their characteristics.

Tools and Materials:

Shovels, picks, rakes, trash barrels, wheelbarrow, shrubs and busshes from local greenhouses.

Bibliography:

Gilbert, Harold G., Children Study American Industry. Wm. C. Brown Publishing Company, Dubuque, Iowa, 1966, pp. 110-128.

CONSTRUCTION

Assignment: 17

Grade Level: 5-6

Title: Locating the Structure

Definition: Locating the structure is that part of planning where the various conditions are considered and all specifications are met regarding zoning, building codes, and surveying a particular site.

Objectives: As a result of the learning experiences the students should be able to construct a batter board and apply it in a learning situation; use a plumb bob in a proper manner when locating the center line.

Activities:

1. Make a batter board and understand how it is to be used.
2. Construct a simple plumb bob in class and learn how to use it.

Teaching Procedure:

1. Use 2"x4" boards about 3 feet long for the legs. 3 legs needed for each batter board.
2. Use 1"x6" boards for the top braces.
3. Assemble the batter boards and then set them up on a marked off site in the school yard.
4. Use a plumb bob and tape rule as your measuring tools.
5. Set up a building lot for a house using a 32'x52' size.

Relationships:

1. Mathematics: Compute all measurements on the chalkboard.
2. Language Arts: List all the new words and how they are used in the construction industry.

Tools and Materials:

Lumber 2"x4"x3' (12 pcs.), 1"x6"x2' (8 pcs.), some 8D nails, claw hammer, 50 foot tape, plumb bob, heavy hammer, mason's line, line chalk.

Bibliography:

The World of Construction, Industrial Technology I, Volume I, Unit 63.

Assignment: 18 Grade Level: 5-6

Title: Earthmoving

Definition: Earthmoving is that process where material characteristics of soil and rock is changed by the removal of spoil or loose materials from the site.

Objectives: As a result of the learning experiences the students should be able to collect various soil samples and perform tests on soil erosion; plant grass seeds and observe their growth in different types of soils.

Activities:

1. To collect five different soil samples and observe how each is affected by water erosion.
2. Students should plant grass seeds in paper cartons and check on growth.
3. Test minerals for chemical make-up.

Teaching Procedure:

1. Get pint jars and fill them three quarters full of 5 types of soil found in the area.
2. Take ¼ cup of water and place this on top of each jar of soil.
3. Measure the amount of time required for the water to reach the bottom of the jar.
4. Measure the depth of saturation for each soil.

Reltionships:

1. Social Studies: Collect various soil samples from other parts of the country.
2. Mathematics: Measure with metric and English systems.

Tools and Materials:

5 pint jars, water, 1/4 measure cup, stop watch, soils, 1 foot rule.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Company, Milwaukee, Wisconsin, 1959, Chapter 4.

CONSTRUCTION

Assignment: 19

Grade Level: 5-6

Title: Classifying Structures

Definition: Classifying structures is the analyzing and grouping of constructed projects, based on inteded use and the principal material used in constructing them.

Objectives: As a result of the learning experiences the students should be able to identify many kinds of utility networks - water purification, and sewage; list the transportation problems of the present and the near future in terms of needed construction - parking areas, roads, bridges.

Activities:

1. Visit a city residential block, and count the number of homes, utility poles, transformers, sewer openings (man holes), telephone service lines, etc..
2. Visit a highway construction site - land fill, land cut, cloverleaf and/or small bridge construction.

Teaching Procedure:

1. Discuss the kinds of utility services observed.
2. On a horizontal plan make a scale model of the area studied - not to include structures. a) paint streets, b) use all irregular blocks to represent homes, c) erect utility poles (¼" dowels) d) represent gas, electric, telephone, water and sewer structures with colored yarn or crayon, and e) represent, with colored thread or crayon, the service lines of the above mentioned utilities from the street to the house.

Relationships:

1. Mathematics: Compute the annual utilities cost for their homes.
2. Social Studies: Disucss the effects of the utility industry upon the economy of the area.

Tools and Materials:

Saw, rule, paint brush, straight edge, hand drill and bit, yarn, thread, dowels, plywood, paint, glue and masking tape.

Bibliography:

Newkirk, Louis V., Integrated Handwork, Silver Burdett Co., New York, 1940, pp. 257-266.

CONSTRUCTION

Assignment: 20 Grade Level: 5-6

Title: Setting Foundation Forms Containing Reinforcement

Definition: Setting foundation forms containing reinforcement features is the constructing and positioning of structured temporary supports for concrete, into which permanent strengthening materials have been placed.

Objectives: As a result of the learning experiences the students should be able to measure and cut form materials to size, length with the grain, width across the grain; assemble a form using nails; place and secure satisfactorily reinforcement materials within a form; complete satisfactorily a simple bill of materials.

Activities:

1. Design and construct a form for a flag pole base.
2. Construct a form for a patio stone.
3. Make a foundation for a bird bath.
4. Make a foundation for a base ball home plate.
5. Make a form, and place reinforcement of a small section of sidewalk.

Teaching Procedure:

1. Design a flag pole base to complement the pole.
2. Measure and cut the materials to size.
3. Assemble and square the form.
4. Set the form making sure to: a) square the form, b) have superstructure the proper elevation, and c) level the form.
5. Secure the form to prevent shifting.

Relationships:

1. Mathematics: Linear measure, board measure.
2. Science: Importance of correct placement of reinforcing materials to insure strength and a satifactory foundation.

Tools and Materials:

Hammer, nails, saw, square, level, frame material and reinforcement materials.

Bibliography:

Bedell, Earl L., Household Mechanics, International Textbook Company, Scranton, Penn., 1949, pp. 182-184.

Olson, Delmar W., Industrial Arts for the General Shop, Prentice-Hall, Inc., New Jersey, 1961, pp. 292-295.

CONSTRUCTION

Assignment: 21 Grade Level: 5-6

Title: Completing Foundations by Mixing, Placing and Finishing Concrete

Definition: Completing foundations by mixing, placing and finishing concrete is pouring concrete into forms and smoothing the surface as the use dictates.

Objectives: As a result of the learning experiences the students should be able to list four of the ingredients in a concrete mix; place concrete in a form and make sure no voids exist in it; make a simple bill of material.

Activities:

1. Set a flag pole in a concrete base which has a superstructure.
2. Construct a racing starting block of concrete.
3. Construct forms and complete a foundation of concrete for a bird bath.
4. Using concrete make a small animal feeder.

Teaching Procedure:

1. Position and secure the flag pole in the form.
2. Mix the concrete.
3. Place the concrete in the form.
4. Vibrate or press the concrete to prevent voids.
5. Screed the top surface and then float.
6. Allow the concrete to set.
7. Remove form and finish to desired smoothness.

Relationships:

1. Mathematics: Proper proportions of concrete ingredients.
2. English: Write a story about the manufacturing of cement.

Tools and Materials:

Concrete, form materials, level masonry finishing tools, wire.

Bibliography:

Olson, Delmar W., Industrial Arts for the General Shop, Prentice-Hall, Inc., New Jersey, 1961, pp. 292-295.

Bedel, Earl L., Household Mechanics, International Textbook Co., Scranton, Penn., 1949, pp. 182-184.

CONSTRUCTION

Assignment: 22 Grade Level: 5-6

Title: Building Superstructures

Definition: Building Superstructures is the construction of an architectural unit, above the ground, designed to rest upon and/or be fastened to a foundation.

Objectives: As a result of the learning experiences the students should be able to identify that part of a structure that rests on a solid base; differentiate between substructure and superstructures; compare the size of the base in relation to the size of the superstructure.

Activities:

1. On an existing base, construct a model bridge, spanning a river, using balsa wood.
2. Construct a model log cabin.

Teaching Procedure:

1. Define size and limits of river.
2. Have a roundtable discussion pertaining to the bridge design.
3. Each child should make a free hand sketch of his own bridge design. Finalize drawings.
4. Have children divide into 3 groups: 1) measuring group, 2) cutting group, and 3) assembly group. Construct model bridges.

Relationships:

1. Mathematics: Ratio or scale to existing bridges.
2. Social Studies: To other types of superstructures and their use in different cultures.

Tools and Materials:

Work table, balsa wood strips ¼" square, non-toxic glue, straight pins, work board, drawing paper, soft lead pencils, exacto type knives, aluminum foil, and sand.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Company, Dubuque, Iowa, 1966, pp. 110-129.

CONSTRUCTION

Assignment: 23 Grade Level: 5-6

Title: Building Mass and Masonry Superstructures and Frames

Definition: Building mass masonry superstructures and frames is constructing that part of a structure which is bonded to and rests on a solid base, by joining together preformed units or by moulding materials into a desired shape.

Objectives: As a result of the learning experiences the students should be able to differentiate between frames or superstructures that are shaped from casting, from those that are built from preformed units.

Activities:

1. Mould a concrete, or clay, dam for a tabletop model conservation project.
2. Cast toy bricks of clay and build a power station for the concrete dam.

Teaching Procedure:

1. Have the students research famous dams and draw a series of free hand sketches of dam and power house models. Stress the concept of building to scale. The dam could be cast in milk cartons or plastic containers
2. Contrast the shaping of a structure by moulding in mass to the building of a structure from precast units.

Relationships:

1. Mechanical Drawing or Art: Planning of the dam and power house could be done in a series of free hand sketches.
2. Social Studies: Do research work on famous dams as part of a conservation unit.
3. Science: Discuss the following points; strength of concrete and bricks.

Tools and Materials:

Milk cartons or plastic containers, cement, clay or plaster, sand, water, mixing spoon, knife, rulers, sketching paper, toy moulding machine or plastic tray for small ice cubes.

Bibliography:

-----------------, Concrete Technology, Delmar Publications, Inc., Mountain View Avenue, Albany, New York, 1965, pp. 253-264.

Assignment: 24 Grade Level: 5-6

Title: Erecting Steel Frames

Definition: Erecting steel frames consists of building the steel skeletons of structures.

Objectives: As a result of the learning experiences the students should be able to construct a model of a steel framed structure.

Activities:

Build the Eiffel Tower from "Erector Set" materials.

Teaching Procedure:

1. Using "Erector Set" types of materials construct a model of the Eiffel Tower. Use a scale of 1/8" = 1' - 0".
2. Have children make a free hand sketch of the tower, noting the height, length and width of the structure.
3. Emphasize construction practices in erecting steel frames.

Relationships:

1. Social Studies: The tower could be used as part of a unit on France.
2. Mathematics: To develop the idea of scale, ratio and proportion.

Tools and Materials:

Erector set.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Co., Dubuque, Iowa, 1966, pp. 124-129.

CONSTRUCTION

Assignment: 25 Grade Level: 5-6

Title: Building Wood Frame Superstructures

Definition: The wood superstructure of a house consists of that part of the house located above the basement foundation, or substructure.

Objectives: As a result of the learning experiences the students should be able to read a blueprint and construct a model of the floor of a house including the box sill, bridging and other floor parts and name all these parts, construct a model of a typical wall section including its parts and the names of each.

Activities:

1. Cut out, lay out, and assemble all of the parts to make a model.
2. Visit a construction site, after studying about the construction of a floor in a typical home, and identify all of the parts of the floor watching to see how these are placed together.

Teaching Procedure:

1. Pass out the floor plan which is to be constructed. (Plan is to be completely dimensioned and drawn to scale.)
2. ** Have student, on a separate sheet of paper, list steps of procedure for constructing floor and identify the members shown on the plan.
3. From lumber cut to scale for this model, student is to layout and cut to length joists, joist headers, sills, and bridging.
4. Layout and nail or glue into place the sills and joists.
5. Nail or glue into place bridging material on the top only.
6. Nail the 4 X 8 (scale) pieces for sub flooring and trim to outside of floor section with coping saw.
7. Nail or glue the bottoms bridging material into place.

** Have instructor check procedures before student proceeds to next step.

Relationships:

1. Science: Show types of woods used in building construction (lumber, plywood) and how bridging can be used to strengthen a house. Talk about the holding power of various types of nails and fasteners.
2. Mathematics: Figure the total number of board feet and the cost, for constructing this model floor out of full sized lumber. Determine the meaning of nominal and dimensional sizes of lumber. Layout, by size, the pieces of lumber in the model. (reading a square)
3. Social Studies: How living accomodations are reflected in our lives and occupations.

Tools and Materials:
A plan showing what is to be constructed, pieces of pine or basswood cut to dimension sizes according to scale as indicated on the plan, or by the teacher, small brads, fast drying glue, coping saw or back saw, 1/8" hardboard, cut to scale 4' X 8' pieces of plywood.

Bibliography:

Feirer, John L., Woodworking for Industry. Peoria, Illinois, Charles A. Bennett Company, Inc., 1963.

Assignment: 26 Grade Level: 5-6

Title: Installation of Heating and Air Conditioning Utilities

Definition: The utilities of a building are those items added to a building which help in making it more useful and functional in terms of its intended use. Heating and air conditioning are parts of these and are highly important to the comfort and performance of persons working or residing in buildings during the various seasons of the year.

Objectives: As a result of the learning experiences the students should be able to discuss how heat is transferred by conduction, convection, or radiation; explain how hot water, steam, electrical, and hot air systems operate to supply heat to a building; tell the difference between two different systems of air conditioning.

Activities:

1. Visit home and building sites with as many different types of air conditioning and heating systems as possible and discuss each ones operation.
2. Visit a heating and air conditioning shop where duct work is being fabricated. (supplement with movies)
3. Obtain blueprints showing the various types of heating and air conditioning installations, and identify which is being installed in a building.

Teaching Procedure:

1. Set up laboratory apparatus and conduct experiments on methods of heat transfer.
2. Use movies, filmstrips, and other visual aides on heating and air conditioning units, their installation, etc..
3. Plan field trips to show installations in buildings of heating and air conditioning systems including duct work, piping, etc..
4. Show the students sets of building plans and detailed blueprints of heating and air conditioning installations, identifying the various types of systems to the students and having them also identify these.

Relationships:

1. Science: Methods of heat transfer.
2. Mathematics: Measurement of air displacement and temperature variations.
3. Social Studies: Occupations involved in heating and air conditioning.

Tools and Materials:

Laboratory apparatus for showing or having students experiment with methods of heat transfer. Movies of various heating systems and their installation. Blueprints of types of heating and air conditioning systems in buildings. Books or pamphlets discussing heating and air conditioning.

Bibliography:

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Handbook of Fundamentals, New York, 1967.

Assignment: 27 Grade Level: 5-6

Title: Installation of Plumbing and Piping Systems

Defintion: Installation and construction of plumbing and piping utilities affects directly the intended usefulness of a building. The purposes of these systems may be many and varied but typically might include the transportation of waste products, raw materials, or finished products.

Objectives: As a result of the learning experiences the students should be able to identify the names of six pipe fittings and be able to recognize their symbols on a schematic pipe drawing; cut a specified piece of pipe to length and join it to a fitting of corresponding size and type.

Activities:

1. Using pictorial representations and symbols of pipe fittings, identify these using pipe catalogs or descriptive literature.
2. Using unlabeled samples of pipe, pipe fittings and materials, identify these after labeled samples or pictures have been presented and studied.
3. After cutting a piece of pipe to length join it to the same size fitting and properly seal it.

Teaching Procedure:

1. With the use of pictorial drawings, catalogs, books, magazines, and actual samples of pipes and fittings, acquaint the students with the names and symbols used for identifying types of pipes and fittings.
2. Have the students cut a specified size and type of pipe to length, joining and sealing it to the same size of fitting.
3. Relate the above activities to discussing the piping industry, mechanical and physical properties of pipes and materials used for fluxes, pipes, and scientific phenomena during piping applications.

Relationships:

1. Science: Chemical composition of fluxing agents. Melting points and adhesive qualities of various materials. Application of heat, and expansion and contraction considerations.
2. Social Studies: The uses of pipe in all types of applications and their history. The piping industry.

Tools and Materials:

Paper with pictures and symbols of pipe fittings, pipe catalogs and books on piping, samples of pipes and fittings made from various materials, pipe vise, wrenches, compound, and cutter, solder, flux, and Bernzomatic torch.

Bibliography:

Babbitt, Harold E., Plumbing, Third Edition, New York, McGraw-Hill Book Company, 1960.

Giesecke, Mitchell and Spencer, Technical Drawing, Fifth Edition, The Macmillan Company, 1966.

CONSTRUCTION

Assignment: 28 Grade Level: 5-6

Title: Installing Electrical Power and Communication Systems

Definition: Installing electrical power systems consist of outside work done by linemen, inside work by wiremen, while communication workers install manufactured products.

Objectives: As a result of the learning experiences the students should be able to identify a complete electrical circuit and why they are necessary; list three uses of an electromagnet; chart the history of the telephone. List three safety practices.

Activities:

1. Construct a telegraph set.
2. Examine a telephone kit from the audio-visual or science department.
3. Construct a railroad crossing gate.

Teaching Procedure:

Demonstrate each of the following:

1. Drill holes, sandpaper and paint block.
2. Cut tim to shape, punch holes and bend in vise.
3. Fasten to base with screws.
4. Wind magnetic coil and remove insulation at each end.
5. Connect wire to complete circuit.

Relationships:

1. Mathematics: Experiences in the use of measuring tools.
2. Language Arts: Write a story about the telegraph and follow verbal and written instructions.
3. Social Studies: Study occupations related to the communications industry.
4. Science: The importance of the daily use of an electromagnet in our industrial society.

Tools and Materials:

Tin snips, punch, awl, screwdriver, mallet, paint, brush, rule, tin can, wood block 3"x5"x3/4", magnet wire #36, sandpaper, screws and 8 common nails, 3/16" bit.

Bibliography:

Cook, Sherman, Electrical Things Boys Like to Make, Bruce Publishing Co., Milwaukee, 1952, p. 28.

Newkirk, Louis V., and Johnson, Wm. H., The Electrical Crafts, Macmillan Co., New York, 1943.

CONSTRUCTION

Assignment: 29

Grade Level: 5-6

Title: Making Inspections

Definition: Inspection in the construction industry is the careful examination of the work being done to see if it meets written specifications, plans, federal, state and local codes.

Objectives: As a result of the learning experiences the students should be able to list four reasons why inspections are made, and who makes them; to identify a minimum of four different kinds of roles inspectors have in county, city or local communities.

Activities:

1. Inspect your school building and tabulate all the flaws that you can locate.
2. Measure your classroom and check for squareness.
3. Set-up safety inspection stations for bicycles.

Teaching Procedure:

1. Discuss why inspections are made and who makes them.
2. Discuss and demonstrate how flaws can be detected and corrected.
3. Relate inspection at school to home situations.
4. Point out how codes can limit the designer.

Realtionships:

1. Mathematics: Measurements.
2. Language Art: Art of discussion.
3. Social Studies: Study occupations related to inspection.

Tools and Materials:

Ruler, tape, chalk.

Bibliography:

Zim, Herbert S., Things Around the House, Wm. Morrow and Company, New York, 1954.

Assignment: 30

Grade Level: 5-6

Title: Mediation, Arbitration and Striking

Definition: A strike occurs when labor and management are unable to settle their differences. Mediation is accomplished by friendly intervention of a third party. Arbitration is the settlement of a dispute by persons chosen to hear both sides and come to a binding decision.

Objectives: As a result of the learning experiences the students should be able to explain the role of the arbitrator, mediator and striker; write and prepare a list of grievances for the arbitrator; to list several conditions that may exist if a dispute cannot be settled; and to contrast working conditions of today to that of a factory of 1935.

Activities:

1. Reading of newspaper on local and national disputes.
2. Role play a strike with a group. Invite the principal or other person to come in and act as a mediator.
3. Attend a P.T.A. meeting and observe ways and means used to air grievances.

Teaching Procedure:

1. Discuss and demonstrate the organization necessary for role playing strike.
2. Have children bring newspapers to class.
3. Conduct a class meeting on some problem or area of discussion effecting the class.

Relationships:

1. Mathematics: Figure losses of time and money when a strike occurrs. Apply to home situation.
2. Language Arts: Art of discussion, follow verbal instructions.
3. Social Studies: An opportunity to practice human relations in understanding the other person's problems.

Tools and Materials:

Chalk, local newspapers.

Bibliography:

Lens, Sidney, Working Men, G. P. Putnam and Sons, Publishing Company, New York, 1960.

Neal, Harry, Edward, From Spinning Wheel To Spacecraft, Julian Messner Inc., New York, 1964.

CONSTRUCTION

Assignment: 31 Grade Level: 5-6

Title: Enclosing Framed Superstructures

Definition: Enclosing framed superstructures consists of enclosing the exterior of a building with wood, metal, glass, paper, plastics, and masonry to protect the building from the elements.

Objectives: As a result of the learning experiences the students should be able to list two ways that insulation makes living more comofrtable; list three ways of insulation materials; recognize the value of insulation materials as a fire retardant agent, as a noise and sound absorption agent; name three types of insulation materials, e.g. loost fill, rigid and flexible.

Activities:

1. Insulate a model framed wall.
2. Insulate a model framed ceiling.
3. Illustrate how insulation materials help maintain an even degree of temperature within a building, and help reduce noise levels.
4. List ways that insulation materials prevent heat and cold from entering a building and what effects it can have on heating and cooling bills.

Teaching Procedure:

1. Show a film on insulation materials.
2. Discuss the effects of insulation as a: fine retardant agent, as a sound proofing agent, as a material used to maintain comfortable temperatures within a building, and as a means of cutting down heating and cooling bills.
3. Display various types of insulation materials.

Relationships:

1. Science: Sound proofing qualities, fire retarding properties.
2. Mathematics: Estimate cost of insulating a wall of a house using each of three types of insulation materials, flexible,rigid, and loose fill.

Tools and Materials:

Film on insulation materials, several types of insulation materials.

Bibliography:

Townsend, Gilbert and Ralph Dalzell, How to Plan a House, 3rd Edition, American Technical Society, Chicago, Illinois, 1961, pp. 147-188-189.

Arnold, Pauline and Percival White, Homes America's Building Business, Holiday House, Pound Ridge, New York, 1960, pp. 70, 117, 221, 240.

CONSTRUCTION

Assignment: 32

Grade Level: 5-6

Title: Surfacing Interiors

Definition: Surfacing interiors includes the application of ceilings, walls, and floors to make the building functional and serviceable.

Objectives: As a result of the learning experiences the students should be able to recognize various building materials and the reason for using them on interior, and surfaces of buildings.

Activities:

1. Build room divider.
2. Prepare room divider for finishing.
3. Name three wall materials within this classroom.

Teaching Procedure:

1. Place four pieces of pre-cut 1" X 2" soft wood strips in square or rectangular pattern on floor.
2. Fasten corners with corrugated fasteners or 4" X 4" soft wood triangle corners. If both sides are to be used, use only corrugated fasteners.
3. Cut wallboard, plywood, or cardboard to exact size of frame, then fasten to the frame with i inch box nails.
4. Staves 1" X 4" X 10" long should be nailed on each end of wall partition while petition is standing upright on the floor.

Relationships:

1. Art: Choose suitable colors and decorate the project.
2. Social Studies: Sources of the materials used.
3. Mathematics: Estimate quantities and cost of material used.

Tools and Materials:

Try square, 15" crosscut saw, 6' steel tape, X'acto knife, small box of nails, corrugated fasteners, 13 oz. claw hammer, 4-1" X 2" strips of soft wood, 2-1" X 4" X 10" pieces of soft wood, sheet of wallboard, 1/4" plywood, sheet of cardboard.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., *Industrial Arts for Grades K-6*. Bruce Publishing Company, Milwaukee, 1959, pp. 120-121.

CONSTRUCTION

Assignment: 33 Grade Level: 5-6

Title: Finishing the Project

Definition: Finishing the project includes major processes of painting, decorating, installing trim, cabinets, and hardware both functional and decorative, on bridges, highways, towers, homes, directional signs, harbors, tunnels, subways, etc.

Objectives: As a result of the learning experiences the students should be able to identify three or more wood base trims by comparing sample trims to end blueprints, these trims should be typical of those found throughout the manufacturing and construction industry.

Activities:

1. Through the study of samples and blueprints students should be able to properly name at least three types of trims.
2. Have students cut various types of trim in a miter box and have trim fit into 90 degree corner.
3. Have students lay out to dimension and end view of one type of wood base trim, one metal trim, and one plastic trim.

Teaching Procedure:

1. Display several types of commonly used trim.
2. Under each piece of trim have an end view print of that particular trim.
3. Discuss the various physical characteristics of each trim, where each is generally used, and for what purpose.
4. Teacher may desire to utilize this lesson by having students miter corners and nail them together at a 90 degree angle.

Relationships:

1. Art: Aesthetic types of trim available to harmonize with other parts
2. Drawing: Understanding the structure of different trims by studying end views of wood trims.
3. Social Studies: Understanding of milling operation that takes place in the lumbering industry.

Tools and Materials:

Several types of wood trim, metal, and plastic, corresponding prints to wood trim displayed, metal, and plastic, miter box and miter and/or back saw, finishing nails, claw hammer, nail set.

Bibliography:

Townsend, Gilbert, and Dalzell, J. Ralph, How to Plan a House, American Technical Society, Chicago, Illinois, Third Edition, Revised, 1961, pp. 435,436, 493.

Feirer, John L., Woodworking for Industry, Chas. A. Bennett Co., Inc., Peoria, Illinois, 1963, pp. 529-530, 535-537, 553.

Assignment: 34 Grade Level: 5-6

Title: Painting and Decorating

Definition: Painting and decorating consists of applying finishes to a surface for the purpose of preserving or enhancing it.

Objectives: As a result of the learning experiences the students should be able to identify two different types of wipe on finishes; apply wipe on finishes satisfactorily; apply paint and lacquers satisfactorily with pressurized spray cans.

Activities:

Applying the finish of their choice, from the finishes they have studied, to a previously constructed object.

Teaching Procedure:

1. Elaborate on types of finishes and the use of each.
2. Have each student work with each finish on scrap wood.
3. Have the students explain and discuss different finishes they have used.
4. Apply finish of their choice to a project.

Relationships:

Science: What chemicals make up finishing materials.

Tools and Materials:

Deft, ben matte, lindseed oil, rags, paint thinner.

Bibliography:

---------------, Mechanix Illustrated, How-To-Do-It Encyclopedia, 1961, Golden Press, New York.

CONSTRUCTION

Assignment: 35

Grade Level: 5-6

Title: Landscaping

Definition: Landscaping is the final operation to so arrange the effects of natural scenery over a given tract as to produce the best aesthetic effect, considering the use to which the tract is to be put.

Objectives: As a result of the learning experiences the students should be able to design a simple landscaping plan for a home; learn about drain tile, and drainage; identify landscape symbols; know about the kinds of soils and their characteristics.

Activities:

1. Construct landscaping for a model home.
2. Identify three symbols used on landscape prints.
3. Mix correct ingredients in soil and plant seeds.

Teaching Procedure:

1. Have pictures, books, and pamphlets on landscaping.
2. Discuss good design from prints made by a landscape architect, pointing out symbols and topography of the site.
3. Have students draw a simple plan, puting symbols on their drawings.

Relationships:

1. Language Arts: Spelling and new word meanings.
2. Science: Soil conditions.
3. Guidance: Vocations students should know about.

Tools and Materials:

Scissors, paste, colored paper, crayons, pencil, ruler and soil.

Bibliography:

Mechanix Illustrated, How-To-Do-It Encyclopedia, Vol. 8, 1961, Golden Press, New York, pp. 1438-1447.

CONSTRUCTION

Assignment: 36

Grade Level: 5-6

Title: Maintaining Property

Definition: Maintaining property is the systematic periodic inspection and maintenance of a building and/or grounds.

Objectives: As a result of the learning experiences the students should be able to know why a home should have periodic inspection and upkeep; repair leaky faucet.

Activities:

1. Repair leaky faucet.
2. Paint a small object.
3. Lawn unkeep.

Teaching Procedure:

1. Have a faucet mounted on portable stand.
2. Have books, manuals, or job sheets on how to install washers.
3. Discuss different types of washers.
4. Show students how to install washers.
5. Have students install washer.
6. Try out to see if it works.

Relationships:

1. Science: How water is held back under pressure.
2. Vocational Guidance: Different types of vocations that students could become interested in.

Tools and Materials:

Wrench, screw driver, faucet that can be hooked up to water, different sizes of washers, rags.

Bibliography:

-------------, Mechanix Illustrated, How-To-Do-It-Encyclopedia, Volume 8, 1961, Golden Press, New York.

MANUFACTURING

MANUFACTURING

Assignment: 1 Grade Level: 5-6

Title: Man and Technology

Definition: Man's knowledge of efficient and systematic application of producing and consuming materials to satisfy his needs and demands. Technology might also be defined as the human activity that changes the material world to satisfy our needs.

Objectives: As a result of the learning experiences the students should be able to understand and apply the term technology. Realize that new products are developed as man shows a need or desire for them. Understand that products are developed and improved ina systematic manner.

Activities:

1. List various ways in which man has changed his world.
2. Trace the historical development of one of the above and prepare a short report.
3. Apply technological process to show how something in present world could be improved or developed.

Teaching Procedure:

1. Through class discussion, introduce the new terms and use them to bring out several products which have developed.
2. According to interests shown, divide the class into at least three groups.
3. Each group should choose some product or area of manufacturing and trace it's development from invention to the present time. (e.g. communications, transportation, the factory system.)
4. Each group, according to topic, could construct models to show progress.

Relationships:

1. Language Arts: Vocabulary, spelling, sentence and paragraph structure. reading skills.
2. Science: Depending upon area chosen.
3. Social Studies: Historical aspect in either fifth or sixth.

Tools and Materials:

This depends on the activity of each class group. If models are constructed, a minimum of wood, saw, hammer, nails or glue would be needed.

Bibliography:

Encyclopedia

MANUFACTURING

Grade Level: 5-6

Assignment: 2

Title: The Beginning of Manufacturing; The Industrial Revolution

Definition: Manufacturing is an organized approach for making a product that man wants or needs. Manufacturing began in the home, and through specialization, increased efficiency, and a demand for increased volume, resulted in the growth of industry to factory form. The Industrial Revolution resulted in the adoption of power driven machinery in almost every phase of production activity.

Objectives: As a result of the learning experiences the students should be able to become familiar with the term manufacturing; understand that the Industrial Revolution came to past as a result of the invention of steam power; understand that the Industrial Revolution took production out of the home and the local craftsman's shop and into the factory; learn that the factory system is more efficient due to mass production.

Activities:

1. Investigate the wide use of steam power and construct models which are appropriate for illustration.
2. Market research to compare cost of products which are hand made to those which are mass produced.
3. Group or individual research and reports on the Industrial Revolution.

Teaching Procedure:

1. Children should be guided to find the various uses of steam power through readings. These could and should be both past and present. When this is done, models could be constructed to illustrate these uses. (Locomotive, early automobiles, etc.) This activity could be carried out by individual students or by small groups. Ideally this activity could be combined with any of the others listed.

Relationships:

1. Science: Power sources.
2. Language Arts: Reading, library skills, vocabulary study.
3. Mathematics: Measurements for the models.

Tools and Materials:

Wood, saw, nails, hammer, glue, tin cans, dowel rods. (Many substitutes can be made depending on availability).

Bibliography:

Encyclopedias

MANUFACTURING

Assignment: 3 Grade Level: 5-6

Title: Manufacturing and the Economic System; Manufacturing Technology

Definition: Manufacturing is the process which our economic system uses to efficiently maintain a high level of productivity. Manufacturing technology is the process of supplying mankind's wants and needs by means of changing raw materials with tools and machinery.

Objectives: As a result of the learning experiences the students should be able to show by a graph that one of every four persons is employed by manufacturers; identify three facts that manufacturing provides one of every three dollars in our economy; define the term technology as applied science to provide man's needs.

Activities:

1. Conduct a survey of their community to see if one of four are connected with manufacturing.
2. Take part in a field trip to a factory to observe the efficiency of operation and the obvious technology involved.

Teaching Procedure:

1. Arrange a field trip to a local factory, making the terms familiar to the students prior to this. Review the first two lessons to help insure continuity of learning, and to reinforce the previous learnings.
2. If it is impossible to arrange a field trip, a movie or other audio-visual aids which are available from many large corporations. One which could be recommended is The Factory, available from Mattell Toys.

Relationships:

1. Language Arts:: Write about their field trip.
2. Mathematics: Make graphs showing employment figures.

Tools and Materials:

Audio-visual equipment.

Bibliography:

-------------, World Book Encyclopedia, Chicago, Field Educational Enterprises, Corp., 1965.

Childcraft, Chicago, Field Educational Enterprises, Corp., 1965.

MANUFACTURING

Assignment: 4 Grade Level: 5-6

Title: Manufacturing and Management Technology

Definition: Manufacturing and management technology is the human activity dealing with man and his relationship to the processes of planning, organizing, and controlling the manufacturing processes.

Objectives: As a result of the learning experiences the students should be able to understand and list four reasons why the manufacturing process in any factory must be organized according to the required products, the machinery, the end product desired, and the personnel involved.

Activities:

1. In connection with the field trip or movie from the previous lesson, follow the raw product through the processing procedures.
2. Ascertain the various departments into which local factories are divided and determine the functions of each.

Teaching Procedure:

1. Compose letters of inquiry to the offices of local factories regarding:
    a) Names of all departments
    b) Functions of each department
    c) Number of people in each department
2. When answers are received, compare for similarities and organization of the processes.
3. Make charts showing the organization of the plant.

Relationships:

1. Language Arts: Writing a business letter.
2. Social Studies: Learn of human relations processes.

Tools and Materials:

Stationery, envelopes and stamps.

Bibliography:

Sullivan, George, How do they Make It?, Westminster Press, Philadelphia, 1965.

MANUFACTURING

Assignment: 5

Grade Level: 5-6

Title: Inputs to Manufacturing, Organization, Ownership, and Profit

Definition: The materials for manufacturing come from genetic reproduction or from extractive processes. The early industries were controlled by single families, but at the present time, corporate enterprises under the ownership and ultimate control of manly individuals produce the majority of the goods. The major motive for manufacturing is profit.

Objectives: As a result of the learning exper ences the students should be able to discern that raw materials are either grown on the earth or are taken from it; identify the various factors involved in pricing a product for sale; identify that factories are owned by large corporations backed by the investments of numerous persons.

Activities:

1. Individual student research into the make-up of corporate structure, and form a mock corporation.
2. Bring in or illustrate samples of reproduce and extracted raw materials.

Teaching Procedure:

1. After discussing the general make-up of corporations, divide the class into groups to research areas of the corporate structure.
2. From the previous lesson on factory organization, decide upon the type of factory to be formed and its departments.
3. Sell bonds, stocks, for board of directors, work out sources of raw materials, machinery, costs of overhead and labor, margin of profit, etc. (This could be carried on into a mass production of a simple product decided upon by the group.)

Relationships:

1. Social Studies: Economics, how man lives.
2. Mathematics: Finance, sales, costs.
3. Language Arts: Writing of bonds and stocks.

Tools and Materials:

Play money, dittoed certificates to be used as stock.

Bibliography:

Boucher, Bertrand, *How Man Provides*, Home Library Press, New York, 1963.

-------------, *Childcraft*, Field Enterprises Educational Corporation, Chicago, 1966.

MANUFACTURING

Assignment: 6 Grade Level: 5-6

Title: Identifying Consumer Demand

Definition: The process of finding out what people will buy, would like to buy, or would not buy by conducting surveys of various kinds **is consumer demand.**

Objectives: As a result of the learning experiences the students should be able to identify two methods by which manufacturers determine whether or not their product will sell; conduct a simple survey among their parents or peers to ascertain if a particular product would have a market.

Activities:

1. From the mock factory formed in previous lessons, and the product decided upon, conduct a survey to determine if the product will sell.
2. Write letters to large manufacturers asking for information regarding the determination of consumer demand.
3. Write letters to Market Research Associates and other organizations which do nothing but conduct surveys for large corporations. Ask for pertinent information.

Teaching Procedure:

Considering the product decided upon in previous lessons, develop a simple questionnaire to be used in an interview with possible consumers. Suggeste points to bring out in the interview would be:

1. Description or a model of the product.
2. Complete description of uses for the product.
3. Estimated cost.
4. Suggested modifications.
5. Would consumer buy such a product? Why or why not?

The questionnaire should be as simple and as short as possible. Careful condiseration should be given the sampling of consumers interviewed. When the survey is completed, it should be analyzed by the class.

Relationships:

1. Language Arts: Letters, development of questionnaire.
2. Mathematics: Comparison and analysis of the questionnaire.

Tools and Materials:

No specialized tools necessary, only regular school supplies of paper, pencils, pens, chart paper for survey analysis.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, The Bruce Publishing Company, Milwaukee, Wis., 1959.

MANUFACTURING

Assignment: 7

Grade Level: 5-6

Title: Researching and Developing

Definition: Research is the careful investigation by scientists and technicians aimed at the discovery of new materials, efficiency in production, and interpreting the findings for the development of new ideas and products.

Objectives: As a result of the learning experiences the students should be able to discern that before a new product is developed, tests are made on the raw materials, the processes, and the product; identify three existing products that are continually tested to make sure they meet certain specifications; discern that products are built according to certain specifications, sometimes regulated by the federal government.

Activities:

1. With the product the class decided upon in earlier lessons, carry out some tests and comparisons with other similar products.
2. Write letters to Underwriters Laboratory and to some federal agencies requesting information on specifications required of manufacturers.

Teaching Procedure:

1. According to the product to be developed by the class factory, have the group decide upon some applicable tests and specifications to be used.
2. Acquire some similar products which are on the market and run them through the same procedures.
3. Compare the class product with others and the ways in which they meet the specifications.

Relationships:

1. Mathematics: Analysis of the tests, measurements.
2. Science: Expose the product to tests of the elements, heat, exposure, extended use, etc..
3. Social Studies: How well does it apply to the improvement of man's wants and needs.

Tools and Materials:

Probably no specialized tools needed, this again would depend on the tests developed. Some tools and/or science materials might be used.

Bibliography:

Boucher, Bertrand, How Man Provides, Home Library Press, New York, 1963, World Book Encyclopedia.

MANUFACTURING

Assignment: 8

Grade Level: 5-6

Title: Designing Manufactured Goods

Definition: Design is the process by which manufacturers plan their products so they will be attractive to, and of more use to the consumer.

Objectives: As a result of the learning experiences the students should be able to identify the use of scale measurements in the design of three dimensional objects; identify the use of proportion in the design of formative materials (concrete, plastics, foods, paper mache, plaster, etc.)

Activities:

1. Have the children make simple scale drawings of objects already in existence to give them a working knowledge of the use of scale. Along with this, figure proportions of existing recipes as listed above.
2. Invite a draftsman or an architect to speak to the class.

Teaching Procedure:

Gather as many blueprints, scale drawings and recipes as possible for the purpose of illustration. After instructing the children in the mechanics of the scale, have them make scale drawings of two or three simple objects (e.g. their desk top, the classroom, a dog house, etc.) figure the proportions in some of the recipes, discuss the importance of correct proportions for consistency of quality, function of the mixture, etc.

Relationships:

Mathematics: Scale, fractions, decimals, measurements.

Tools and Materials:

Ruler, paper, pencil.

Bibliography:

Keane, George R., Teaching Industry Through Production, American Industrial Arts, National Education Association, Washington, D.C., 1959.

5-6

MANUFACTURING

Assignment: 9

Grade Level: 5-6

Title: Creating Alternate Design Solutions; Making Three Dimensional Models

Definition: Once the designing is completed, ordinarily there are alternatives of designs, all of which meet the functional requirements. Before production is begun, models are made for testing purposes, and to aid in setting up the manufacturing process.

Objectives: As a result of the learning experiences the students should be able to redesign a specific product; make a model from the completed designs; identify the importance of these functions of design and model making in the manufacturing industry.

Activities:

1. Finalize the design of the product, decided upon by the class and make models of the product in preparation for production.
2. Write letters to large corporations (Ford Motor Co., General Motors, North American Aviation) and inquire as to their use of prototypes developed for testing before production is begun.

Teaching Procedure:

1. With the product decided upon, divide the class into three or four groups.
2. Each group, using scale and proportion, should develop its own design for the product.
3. When the prototypes are completed, the entire class should compare the designs and choose the one to produce in their factory.
4. The remaining designs and models will be considered as the alternate design solutions.

Relationships:

Mathematics: Scale and proportion.

Tools and Materials:

Rulers, paper, pencil - tools for making the model are entirely dependent on the product chosen by the class group.

Bibliography:

Moore, Harry D. and Donald R. Kibbey, Manufacturing Materials and Process, Richard D. Irwin, Inc., Homewood, Illinois, 1965.

MANUFACTURING

Assignment: 10 Grade Level: 5-6

Title: Refining a Design Solution

Definition: Refining a design is improving the original design as originally conceived by the designer.

Objectives: As a result of the learning experiences the students should be able to design and construct a wooden planter, use basic finishing materials, identify and learn to use simple hand tools.

Activities:

1. Make free-hand sketches of a wooden planter.
2. Make planter from corrected drawings.

Teaching Procedure:

1. Demonstrate a simple design on the chalkboard.
2. Discuss elements and principles of the design.
3. Demonstrate the use and care of hand tools.

Relationships:

1. Science: Studying the growth and reproduction of plants.
2. Mathematics: Use of rule to make accurate measurements of length, width and depth. Estimate quantity and cost of the finished product.

Tools and Materials:

Glue, corrected drawings, red wood, nails, sand paper (medium grade),pencil and eraser, templates, hammer, and hand saw.

Bibliography:

Harris, O. S., Industrial Arts, Handcraft Activities, University of Georgia, Athens, Georgia, 1961, pp. 21, 28, 29.

Gerbracht, Carl, and Babcock, Robert J., Industrial Arts for Grades K-6. The Bruce Publishing Co., Milwaukee, Wisconsin, 1959, pp. 89-94.

MANUFACTURING

Assignment: 11 Grade Level: 5-6

Title: Engineering the Product

Definition: Engineering a product is discovering a solution to a problem through analysis; deciding upon a solution to be used in obtaining the finished product.

Objectives: As a result of the learning experiences the students should be able to decide upon a basic design for a periscope; draw and dimension a periscope; determine through trial and error the location of the mirrors.

Activities:

1. Make several design sketches of solutions to the problem of designing a periscope or wind tunnel.
2. Select the best design and make an orthographic drawing of it.
3. Prepare a bill of materials for the construction of the periscope or wind tunnel.
4. Prepare a layout drawing or development of the periscope or wind tunnel.

Teaching Procedure:

1. Demonstrate the purpose of a periscope.
2. Show how plans are drawn.
3. Show the importance of mirror placement.
4. Discuss necessary tools and materials for constructing a periscope.
5. Prepare a working drawing, bill of materials, and layout pattern for a periscope.
6. Construct an experimental model of the periscope out of cardboard.

Relationships:

1. Mathematics: Determing dimensions of objects.
2. Art: Drawing designs.
3. Science: Demonstrating angles of reflection.

Tools and Materials:

Mirrors, glue, cardboard, drawing paper, rules and yard stick, protractor, pencil.

Bibliography:

Babcock, Robert J., and Gerbracht, Carl, Industrial Arts for Grades K-6. The Bruce Publishing Co., Milwaukee, Wis., 1959, pp. 89-94.

Showalter, Hazel F., Small Creation for Your Tools, The Bruce Publishing Co., Milwaukee, Wis., 1967.

MANUFACTURING

Assignment: 12

Grade Level: 5-6

Title: Designing Power Elements

Defintion: Determining power requirement necessary for the job or project and designing the equipment necessary to meet those requirements.

Objectives: As a result of the learning experiences the students should be able to compare the different sources of power; design the equipment that will produce the power to do a job or project.

Activities:

1. Make a steam turbine.
2. Make electromagnets and electrical quiz board.
3. Wire bell circuit.

Teaching Procedure:

1. Demonstrate the proper use of the tools required.
2. Draw on the chalkboard a complete layout of a steam turbine.
3. Demonstrate to show that the shape and spacing of the fins on the disk of the steam turbine will determine its efficiency.
4. Compare the power obtained from a steam turbine with that of a water wheel.

Relationships:

1. Science: Will become acquainted with steam as a source of power.
2. Mathematics: Will conceive the importance of the concept of accurate measurements.

Tools and Materials:

Tin snips, bucket with top, nails, hammer, water, and hot plate.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Co., Dubuque, Iowa, 1966, pp. 153-163.

MANUFACTURING

Assignment: 13

Grade Level: 5-6

Title: Making Working Drawings

Definition: A working drawing is one which contains all the information necessary to make a part, object or product.

Objectives: As a result of the learning experiences the students should be able to sketch out a typical three view drawing on graph paper.

Activities:

1. Using objects as models, students are to develop three view drawings on graph paper.

Teaching Procedure:

1. Discuss the theory of orthographic projection (working drawing).
2. Using the chalkboard, demonstrate how to sketch a three view drawing.

Relationships:

1. Health and physical education: Provides practice in hand-eye co-ordinatio and large and small muscle development.
2. Language arts: Children learn that drawings assist in communicating ideas.
3. Mathematics: Provides children with the opportunity to use numbers and measuring devices.
4. Art: Assists in teaching the concept of size, proportion and symmetry.

Tools and Materials:

8 1/2" X 11" graph paper, pencil, eraser, 12 inch rule.

Bibliography:

Feirer, John L., Drawing and Planning for Industrial Arts. Chas. A. Bennett Co., Peoria, 1963, pp. 15-16.

MANUFACTURING

Assignment: 14

Grade Level: 5-6

Title: Building the Production Prototype

Definition: A production prototype is a model that acts as a standard from which to make a reproduction - with or without a change.

Objectives: As a result of the learning experiences the students should be able to work from student made sketches or working drawings and develop a production prototype.

Activities:

1. Students will either design or copy a simple and functionable project.
2. After determining the design, students will then experiment with materials and ways of fastening them together.
3. Students will modify the design in the above activities and construct a production prototype.

Teaching Procedure:

1. Discuss the term prototype and its importance to industry.
2. Discuss the theory of good design.
3. Demonstrate the use of basic wood tools.

Relationships:

1. Social Studies: Develops an appreciation for work.
2. Mathematics: Develops skills in measuring.
3. Science: Illustrates how different materials offer various degrees of resistance.
4. Art: Assists in the development of self-expression.
5. Health and Physical Education: Aids in the development of small muscles, develops an awareness of personal safety.

Tools and Materials:

Woodworking tools, various materials, wood, plastic, metal, leather.

Bibliography:

Olson, Delmar W., Industrial Arts for the General Shop, Prentice-Hall, Inc., Englewood Cliffs, 1968, pp. 1-11.

Assignment: 15 Grade Level: 5-6

Title: Planning Production

Definition: Planning production is a detailed and systematic series of activities leading up to the output of a product.

Objectives: As a result of the learning experiences the students should be able to determine the operations necessary to complete a simple product; develop an appreciation for careful planning and list three requirements of good planning; and determine the cost of materials needed to construct a simple product.

Activities:

1. Students are to determine the tools and materials needed to complete the product that they designed.
2. Students are to select or design a product using wood.
3. Students are to experiment with the tools and materials needed to complete the product.

Teaching Procedure:

1. Discuss the purpose of planning and how important it is to industry.
2. Tell and demonstrate how to make a bill of material and how to estimate the cost of lumber.
3. Demonstrate the use of several hand tools that will assist in making the product.

Relationships:

1. Mathematics: How mathematics can be used to determine the cost of materials. The importance of mathematics in reading drawings.
2. Language Arts: Show the importance of reading and writing in conveying ideas.
3. Social Studies: Illustrates how planning is related to production in industry.

Tools and Materials:

Paper, pencil, nails, glue, woodworking tools, ½" pine.

Bibliography:

Groneman, Chris H., General Woodworking, Webster Division, McGraw-Hill Book Co., St. Louis, 1959, pp. 1-12.

MANUFACTURING

Assignment: 16 Grade Level: 5-6

Title: Planning Processes

Definition: A detailed schedule of manufacturing processes or steps in producing a product.

Objectives: As a result of the learning experiences the students should be able to related to the teacher the processes or steps in producing a polyester soap dish.

Activities:

1. After one or more soap dish designs have been selected, help the children list the various steps or processes necessary for the "mass" production of the soap dish.
2. Other ideas might include: Planning for soap production, occasion cards from linoleum block and potato prints, etc.

Teaching Procedure:

1. Discuss how the dish will be produced and elaborate on how modern manufacturing would produce the product.
2. After a design has been selected, each student should recognize each process in the manufacture of the soap dish.
3. Divide the class into process groups:
   - a. making or preparing the molds
   - b. measuring and mixing the ingredents
   - c. pouring the polyester ingredent mix in molds
   - d. after curing time, check quality control
   - e. finishing the product-paint, sand, polish, etc.
   - f. packaging for consumer

Relationships:

1. Mathematics: Preparing formula and mixing polyester and catalyst.
2. Chemistry: A study of the plastics field.
3. Economics: The impact of the plastics industry.

Tools and Materials:

Work station areas for each process group, small tools, beakers, plaster, paint, sandpaper, packaging material.

Bibliography:

Swanson, Robert, Plastics Technology, McKnight and McKnight Publishing Company, Bloomington, Illinois, 1965.

Cherry, Ramond, General Plastics, McKnight and McKnight Publishing Company, Bloomington, Illinois, 1967.

MANUFACTURING

Assignment: 17

Grade Level: 5-6

Title: Technical Writing and Illustrating.

Definition: A detailed, written description of a product with a photograph or technical sketch of the product.

Objectives: As a result of the learning experiences the students should be able to demonstrate his ability to describe in detail an engineered product and to be able to "illustrate" the product in use by the consumer on an 8½" x 11" piece of paper.

Activities:

1. Have each child compile a list of the important features, dimensions, innovations or other pertinent details that help describe a polyester plastic, soap dish.
2. After the child has described the product, he is to draw an illustration of the manufactured product being used by the consumer.
3. Other ideas might include: Occasion cards from silk screen, potato or linoleum block, candles, paper weights, etc.

Teaching Procedure:

1. Discuss the various shapes and designs of soap dishes that may be produced from polyester resin.
2. Discuss the properties and limitations of polyester resin use.
3. After a design has been chosen, have each child write about the decoration, function, innovation, color, dimention or other verbalizations to describe the product.
4. Each child should produce an illustration of the product in use by the consumer on an 8½" x 11" piece of paper.

Relationships:

1. Language Arts: Writing.
2. Mathematics: Preparing dimensions.
3. Fine Arts and Drafting: Illustrating.

Tools and Materials:

8½" x 11" paper and drawing materials.

Bibliography:

Cherry, Ramond, General Plastics, McKnight and McKnight Publishing Co., Bloomington, Illinois, 1967.

Swanson, Robert, Plastics Technology, McKnight and McKnight Publishing Co., Bloomington, Illinois, 1966.

Giesecke, Mitchell and Spencer, Technical Drawing, New York, New York, Macmillan Company, 1962.

MANUFACTURING

Assignment: 18 Grade Level: 5-6

Title: Operating Quality Control System

Definition: An inspection during and after production, to determine if the product meets specifications.

Objectives: As a result of the learning experiences the students should be able to produce a polyester soap dish on a production line basis and determine if the product meets specifications.

Activities:

1. Have your students produce a polyester plastic soap dish, using assembly line techniques. During production and after curing, an inspection must be made to insure that the product being produced meets specifications.
2. Other Quality Control activities might include: candle production, ocassion cards, bird feeders, or other manufactured products.

Teaching Procedure:

1. Discuss problems in the production of a polyester plastic soap dish.
2. Discuss what specification minimums will be acceptable.
3. On a production line basis, produce a soap dish.
4. Select several children to make certain that the dishes being produced meet specifications. Dispose of those that do not meet standards.

Relationships:

1. Chemistry: In the study of plastics.
2. Mathematics: In the measurements of standards or specifications.

Tools and Materials:

Polyester resin and catalyst, mold and possibly mold release, containers to mix resin and ingredents, 600 and 280 grit sand paper for finish, polish by hand or buffers, and embediments.

Bibliography:

Swanson, Robert, Plastics Technology, McKnight and McKnight Publishing Co., Bloomington, Illinois, 1965.

Cherry, Ramond, General Plastics, McKnight and McKnight Publishing Company, Bloomington, Illinois, 1967.

Assignment: 19 Grade Level: 5-6

Title: Designing and Engineering the Plant. Suppling Equipment and Materials

Definition: Designing is the process of initiating and developing an idea. Engineering is planning the production line to obtain a better product at a lower cost.

Objectives: As a result of the learning experiences the students should be able to estimate equipment, materials, and personnel expenses for a classroom factory; to engineer the production line for an item manufactured in the shop factory; to design a classroom factory layout.

Activities:

1. To design and engineer the following:
    a. A window-space class terrarium.
    b. A mechanical graph for the mathematics cove.
    c. A cement seed cup for individual experiments.

Teaching Procedure:

1. To design and engineer a cement seed cup and show the importance of cement in ancient and modern times.
2. List on the board the materials needed and estimate expenses.
3. Sketch a model pot and let the pupils make their own drawings of this and the shop layout.

Relationships:

1. Science: Experiments on how seeds develop.
2. Mathematics: Estimating cost, and quantities.
3. Art: Painting.
4. Social Studies: Cement base for buildings, bridges, roads.
5. Reading: Romans and construction.

Tools and Materials:

8½" x 11" graph paper, ruler, compass, pencil, abrasive paper, paints, paper cups to show size.

Bibliography:

Willoughby, George and Risk, Norman, Construction for Elementary Grades, Royalle Publishing Co., Detroit, Michigan, 1958, pp. 1, 16-17.

Feirer and Lindbeck, Industrial Arts Education, Center for Applied Research Education, Stanley Hall, Inc., New York City, 1964, pp. 1-20.

MANUFACTURING

Assignment: 20 Grade Level: 5-6

Title: Employment and Occupations, Hiring and Training

Definition: Manufacturing personnel technology entails hiring and training suitable employees for job skills and services.

Objectives: As a result of the learning experiences the students should be able to work successfully to demonstrate four factors in a classroom factory. as; a) an employee, b) a foreman, and c) a management training personnel representative.

Activities:

1. To manufacture terrariums for the primary grades.
2. Help them make miter boxes.
3. To follow the teacher's directions to make prehistoric animals by using sawdust and wire sculpture.

Teaching Procedure:

1. In making glass terrariums in the classroom factory production and assembly line groups would be formed.
2. On a flat surface place a piece of single strength glass in the center.
3. Line up around this four other pieces.
4. Medium-wide waterproof adhesive tape seals the seams with a V cut on corners inside and out.
5. Place inside the container soil and anchored plants and seal on the cover.

Relationships:

1. Science: Sun evaporation, how plants grow.
2. Mathematics: Measuring and assembling parts.
3. Social Studies: Matching the man and the job.

Tools and Materials:

2 pieces of glass 6" x 12", 1 piece of glass 9" x 12", 1 piece of glass 6" x 9", waterproof adhesive tape, soil, plants.

Bibliography:

Willoughby and Risk, Construction Projects for Elementary Grades, Royalle Publishing Company, Detroit, Michigan, 1958, pp. 8-9.

Warner, Wm. E., A Curriculum to Reflect Technology, Epsilon Pi Tau Inc., Columbus, Ohio, 1965, pp. 20-23.

MANUFACTURING

Assignment: 21

Grade Level: 5-6

Title: Harnessing Energy from Nature. Securing Reproducible and Extracted Raw Materials

Definition: In harnessing energy from nature, natural fuels are used to power machines. Reproducible raw materials are genetically produced while extracted raw materials are drawn out of the earth.

Objectives: As a result of the learning experiences the students should be able to manufacture products from extracted and reproducible raw materials; use human, wind and electric power.

Activities:

1. To manufacture wooden bookends with a copper tooled design.
2. To make prints from carved soap using human power.
3. To make a crystal radio.
4. To make a kite for wind power.
5. Show film on either coal mining or oil drilling.
6. Extract a small quantity of clay, gravel, and sand.
7. Construct a cardboard model of a water wheel.

Teaching Procedure:

To make prints from carved soap, you need a large bar of soap. Draw a design or initials on tracing paper and carve the soap. Ink the water-base inks. Apply paper and use brayer. Use for booklet or cover of paper.

Relationships:

1. Language Arts: Booklet, communication media.
2. Art: Design and layout.
3. History: The first printing press.

Tools and Materials:

Large bar of soap, knife, tracing paper, brayer, water-base ink, pencil.

Bibliography:

Miller and Culpepper, Experience with Electrons, McKnight and McKnight Publishing Company, Bloomington, Illinois, 1966, pp. 51-56.

Smith and Maddox, Elements of American Industry, McKnight and McKnight Publishing Company, Bloomington, Illinois.

MANUFACTURING

Assignment: 22

Grade Level: 5-6

Title: Manufacturing Production Technology

Definition: Manufacturing production technology consists of converting some raw material which may be genetic or extractive into a usable product.

Objectives: As a result of the learning experiences the students should be able to develop the ability to plan a project, collect raw material and complete the project in an efficient workmanlike manner.

Activities:

1. To construct an illuminated house number.
2. Make a table lamp.

Teaching Procedure:

1. Cut 1 piece of wood 12"x6"; 2 pieces 12"x3" and 2 pieces 6"x3".
2. Cut 1 piece of plexiglas 12"x6".
3. Nail the pieces of wood together.
4. Drill holes in the plexiglas and drive in the screws.
5. Design and paint the number on the plexiglas.
6. Assemble the socket, bulb and the plug.
7. Insert the electric bulb inside the box.

Relationships:

1. Mathematics: Teaching measurements.
2. Science: Uses of electricity and how it is produced.

Tools and Materials:

Wood, nails, plexiglas, electric socket, paint, screws, light bulb.

Bibliography:

Griswold, Lester, Handicraft, Prentice-Hall, Inc., New York, 1952.

Smith, Lavon B., Marion E. Maddox, Elements of American Industry, Bloomington, Illinois, 1966.

Assignment: 23 Grade Level: 5-6

Title: Preparing Raw Materials

Definition: The preparation of material from its natural condition to a state where it can be used in the manufacture of goods.

Objectives: As a result of the learning experiences the students should be able to understand that raw materials are the basic elements in a finished product; know and discuss the steps in producing a cutting board.

Activities:

Design and prepare materials for a cutting board.

Teaching Procedure:

1. Discuss and choose the best kind of wood available to the classroom for a cutting board.
2. Design a pattern for the board.
3. Trace the pattern on the wood.
4. Cut out the pattern with a coping saw, or sabre saw or a jig saw.
5. Prepare sandpaper, linseed oil or shallac for the finishing touches on the board.

Relationships:

1. Mathematics: Study of measurement.
2. Art: Study design and patterns.
3. Safety: Use of tools and machinery safely.

Tools and Materials:

Plywood, coping saw, paper, linseed oil, shellac, sandpaper.

Bibliography:

Newkirk, Louis V., and Zutter, Lavada, Your Craft Book, International Textbook Company, Scranton, 1946.

Assignment: 24 Grade Level: 5-6

Title: Establishing a Safety Program

Definition: Establishing a safety program is a conscious and organized program of developing safe conditions and precautions.

Objectives: As a result of the learning experiences the students should be able to observe the rules concerning the operation of a machine to prevent injury from direct contact with the moving parts of the machine; and use necessary precautions to avoid accidents.

Activities:

1. Viewing of film strips and movie films.
2. Construct safety posters of unsafe conditions and display in school.
3. List unsafe conditions found in your home.

Teaching Procedure:

1. Explain the general statement "All accidents could have been avoided."
2. Proceed with presenting the film and filmstrips.
   a) Safety in Shops and Laboratory - filmstrip.
   b) Making Your Home Safe - filmstrip.

Relationships:

1. Health: Consequences of an accident.
2. Mathematics: Compare expenses of a doctor's bill to money spent on protective gear.
3. Art: Use poster board and art materials for safety posters.

Tools and Materials:

Film and filmstrips.

Bibliography:

Safety in Shops and Labs , McGraw-Hill Films, New York, New York.

Making Your Home Safe, McGraw-Hill Films, New York, New York.

Make Your Home Safe, Bureau of Visual Education, Cleveland, Ohio.

MANUFACTURING

Assignment: 25

Grade Level: 5-6

Title: Organized Labor and Collective Bargaining, Working, Advancing, and Retiring

Definition: Organized labor and collective bargaining is the study of the growth of labor as an important part of the American Industrial Society, including a study of the individual worker's needs; his working conditions, advancement opportunities, and retirement.

Objectives: As a result of the learning experiences the students should be able to identify the "assembly line process" and what it means to the individual worker; explain the following terms: organized labor, collective bargaining, working, advancing, and retiring.

Activities:

1. Organize the class into an assembly line and mass produce a note pad holder made from wood.
2. Have the class make a large model factory out of cardboard using small plastic figures, tools, and machines from children's toy sets.

Teaching Procedure:

1. Discuss the labor movement in the United States and point out the following: collective bargaining, working conditions, advancement opportunities, and retirement plans.
2. Discuss the "assembly line process" and its effect on industry and the individual worker.

Relationships:

1. Social Studies: Labor movement in the United States.
2. English: Spelling and vocabulary terms.

Tools and Materials:

Hammers, files, saws, drills, nails, screwdrivers, abrasive paper, finishing material and glue.

Bibliography:

Platts, Mary E., Create, Educational Service, Inc., Benton Harbor, Michigan, 1966 pp. 112-138.

MANUFACTURING

Assignment: 26 Grade Level: 5-6

Title: Making Components or Finished Products.

Definition: Making components or finished products is the process or processes of designing, drawing, manufacturing, assembling, and inspecting parts or finished products.

Objectives: As a result of the learning experiences the students should be able to:

1. Design a pair of book ends.
2. Make a working drawing.
3. Identify mass production techniques.

Activities:

1. The students are to select, design, and mass produce a pair of book ends.
2. Have the class design and make toy car models to be used for mass producing plastic cars using the hobby vacuum forming machine.

Teaching Procedure:

1. Demonstrate a simple design problem on the chalk board and point out how the final design is selected.
2. Have students sketch sample designs on graph paper.
3. Explain the importance of design and how it will effect the finished product by pointing out the logical sequence of steps in producing any product.

Relationships:

1. Mathematics: The students could be working on board measure problems and measuring devices.
2. Science: Study the tree and the many by-products of the tree.
3. Social Studies: The lumbering industry and how it affects our daily life.

Tools and Materials:

Wood saws
Files
Planes
Miter Box
Coping saws
Hammers
Abrasive paper
Nails
Glue
Finishing materials

Bibliography:

Gilbert, Harold G., Children Study American Industry. Wm. C. Brown Co., 1966, Dubuque, Iowa, pp. 41-49.

Assignment: 27

Grade Level: 5-6

Title: Material Removing Practices

Definition: Material removing practices are the processes of cutting, shearing, and abrading materials.

Objectives: As a result of the learning experiences the students should be able to make a simple wall plaque; use simple hand tools in chip removing and shaping operations; design simple wall decorations; apply finishing materials; and identify 5 methods of material removal practices.

Activities:

1. Have the class design and construct decorative wall plaques using wood, metal, plastic, paper, or a combination of materials.
2. Make sketches of modern designs and transfer to soap. The students should then cut out their design and polish it.
3. Have the class design and construct small jewel boxes using ice cream sticks.

Teaching Procedure:

1. Demonstrate a sample wall plaque design on the chalkboard.
2. Demonstrate the use of simple hand tools.
3. Demonstrate the care and application of finishing materials.

Relationships:

1. Mathematics: Geometric construction and measuring devices.
2. English: Spelling and vocabulary.

Tools and Materials:

Hammers, files, saws, planes, abrasive paper, and finishing material.

Bibliography:

Platts, Mary E., Create, Educational Service, Inc., Benton Harbor, Michigan, 1966, pp. 121-134.

Assignment: 28

Grade Level: 5-6

Title: Material Removing by Non-Traditional Processes

Definition: Material removal is the separation of a varying amount of material from any substance. Non-traditional methods refer to such practices of cutting and abrading as laser beam, electronic arc, etc.

Objectives: As a result of the learning experiences, the student should be able to differentiate between a non-traditional process and a traditional process of removing material, using the laser beam as the non-traditional process.

Activities:

1. Make a comparative study by listing at least 3 ways in which cutting and abrading material in the traditional manner is now being replaced by the laser beam.
2. Give reasons why the laser beam would be the better method.

Teaching Procedures:

1. Elaborate on the definition of material removing by non-traditional processes. Point out the necessity of knowing about the nature of atoms.
2. Bring in books and show pictures on the opaque projector.
3. Trips to factories, hospitals or TV stations that use both or either method of material removing - if available in your community - should be taken to point out how the laser beam has replaced the following: material which was once cut away by the surgeon's knife; holes that were once bored in metal by a drill; and gems that were split by a jeweler's saw or drill.
4. Point out how the unusual characterestics of laser light makes the laser a promising tool in 1) industry, 2) medicine, 3) navigation, and 4) communication.

Relationships:

1. Science: To use in correlation with the study of heat energy and atoms.
2. Social Studies: How industries and man are being affected by modern inventions.

Tools and Materials:

Film projector, opaque projector and pictures
Books, paper and pencil

Bibliography:

Navarra and Zafforoni, Today's Basic Science, Harper and Row, N.Y., N.Y., 1963.
Brotherton, Manfred, Masers and Lasers, How they Work; What they Do, McGraw-Hill N.Y., N.Y., 1964.
Carroll John Millar, The Story of the Laser, Dutton Press, N.Y., N.Y., 1964, illus.
Lytel, Allan H., ABC of Lasers and Masers, H.W. Samd, Indianapolis, Ind., 1965.

MANUFACTURING

Assignment: 29

Grade Level: 5-6

Title: Material Forming Practices

Definition: Material forming is the process by which a material is molded, bent, cast, or otherwise made into a new shape.

Objectives: As a result of the learning experiences, the student should be able to shape a ball of moist clay into a pinch pot.

Activities:

1. Form a 2" ball of moist clay into a pinch pot.
2. Sketch at least two preliminary ideas before working with the clay.

Teaching Procedures:

1. Elaborate on the definition of material forming. Explain the different steps in working with clay. Point out how the sequence of steps pertains to many material forming processes, especially when working with forms made from clay.
2. Demonstrate the steps by first designing a pinch pot on the board. Show how to wedge the clay (squeeze and mash to rid of air holes and soft spots) and roll into a ball. Use of knuckles and fingers to shape and smooth the pot.
3. Explain and demonstrate how to decorate the bowl with tempera and liquid detergent. Cover the pot with shellac when dry to protect the paint.

Relationships:

1. Social Studies: Apply the techniques of forming to make shapes for models of Greek, Roman or American Indian pots. Giving them samples
2. of designs of these cultures, they can finish the product by decorating them.
2. Language Arts: Reading stories about how pottery was made and what the design symbols meant.
3. Art: Developing the shape and selecting the design.

Tools and Materials:

2" ball of moist clay, paper and pencil, illustrations and sample of pinch pot, tempera, liquid detergent, brushes, shellac, samples of symbols used in designs.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown, Dubuque, Iowa, 1966, pp. 66-73.

The Colorado Occupation Therapy Assoc., At Your Fingertips, Smith-Brooks Printing Company, Denver Colorado, 1954, pp. 35-37, 65-94.

MANUFACTURING

Assignment: 30 Grade Level: 5-6

Title: Hot and Cold Working

Definition: Material working practices are performed under two processes. Hot working is the process by which heat is necessary in the shaping of material. Cold working refers to working materials which can be shaped at room temperature.

Objectives: As a result of the learning experiences the students should be able to:

1. Design and shape a bracelet from a piece of colonial brass 1 1/4" in width.
2. Using bond paper, determine the length of the bracelet by using your own wrist and develop 2 designs with curved lines on this paper.

Activities:

1. Elaborate on the definition of cold working, referring to other materials besides metal. Point out how the sequence of steps pertains to any cold working of metalcrafts such as; napkin rings and holders, place card holders, desk sets, rings book ends, earings or lapel pins.
2. Give them experience in using a center punch, twist drill and jeweler's saw on pieces of scrap metal.
3. List the steps on the board to be followed. Sketch some possible designs, pointing out that curved lines are easier to saw for beginners.
4. Demonstrate shaping the metal over a piece of 1 1/2" water pipe. Point out again, how the knowledge and skill obtained here can be utilized in the working of metal into many other objects. (See #1)

Relationships:

1. Social Studies: Study design and form of bracelets of ancient cultures, American Indian, and warriors of different countries.
2. Language Arts: Read stories about the designs of bracelets, what they once symbolized or represented.
3. Science: Where metals are mined, refined and how they are used.

Tools and Materials:

1 1/4" width of colonial brass, bond paper, pencil, ruler, scissors, bench shear, shellac, 10" flat metal file, steel wool, alcohol, needle files, twist drill 1/16", jeweler's saw, center punch, section of water pipe (1 1/2" diameter, 3" long) vise, mallet.

Bibliography:

Moore, Hamburger, Kingzett, Handcrafts for Elementary Schools, D.C. Heath, Boston: 1953, pp. 223-237.

MANUFACTURING

Assignment: 31 Grade Level: 5-6

Title: Casting

Definition: Casting is the reproduction of an original through the introduction of a viscous material into a mold where it is solidified.

Objectives: As a result of the learning experiences, the student should be able to produce an object by pouring slip into a plaster mold.

Activities:

1. Pour slip (specially prepared clay body which is very fluid) into a plaster mold, allowing it to remain there until the desired thickness is reached, depending on the size of the piece and its use, such as bowls, vases, tumblers or simple figurines.

Teaching Procedures:

1. Elaborate on the definition of casting. Relate slip casting to pouring other viscous materials as plastic or plaster into molds to form objects such as jewelry, statues, candle holders, or other ornamental pieces.
2. List the steps to follow in pouring slip.
3. Demonstrate how to screen slip to rid it of lumps and to pour slip back and forth between 2 pitchers to avoid air bubbles.
4. Apply glaze to the finished casting.

Relationships:

1. Social Studies: Correlate the objects cast with areas or subjects studied. e.g. Chinese rice bowl, Dutch shoes, candle holders used in Colonial times, Indian, Greek, or Roman jugs.
2. Mathematics: Estimate the volume of slip to fill the molds, keep track of the time the slip was in the mold to duplicate the process and measure the temperature for firing the clay.
3. Language Arts: Follow verbal directions and working from written instructions.
4. Art: Selecting the design and choosing appropriate glazes.

Tools and Materials:

Plaster mold, Slip, Gallon jar, Knive, sponge and pans, 2 pitchers, Newspapers, Glaze, Soft, one inch brush.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown, Dubuque, Iowa, 1966, pp. 93-100.

The Colorado Occupation Therapy Assoc., At Your Fingertips, Smith-Brooks Printing Co., Denver, Colorado, 1954, pp. 71-72.

MANUFACTURING

Assignment: 32 Grade Level: 5-6

Title: Combining Materials into Products

Definition: The process of combining materials into products is the bringing together of various substances to form a more complex item.

Objectives: As a result of the learning experiences the students should be able to glue letters on wood strips. Glue tile shapes on wood backing. Combine powder paste with water to form liquid paste. Combine powder paints (tempera) with water to form a liquid. Combine yarns to make a hot pad. Combine reeds to form a basket.

Activities:

1. The student will mix tempera paint or wall paper paste, or mix Castolyte for casting.
2. He will make a name pin or tie slide, using his own design.
3. He will weave a basket or hot pad mat.

Teaching Procedure:

1. Explain the combining of paste (powder) to make a liquid paste. Demonstra
2. Explain and demonstrate the combining of paint powder to make a liquid paint.
3. Explain the combining of Castolyte with hardener to form a casting material.
4. Explain and demonstrate how to make a mosaic or name pin.
5. Explain and demonstrate the weaving of baskets and hot pad mats.

Relationships:

1. Reading: Directions, recipes, the development of mosaics.
2. Mathematics: Computation of proportions, fractions.
3. Science: Chemical changes in matter.
4. Social Studies: The influence of plastics on our world.
5. Spelling: New words and their meanings; ie. catalyst, Castolyte, mosaic.

Tools and Materials:

Powdered tempera paint, tuna fish cans, water, newspapers
Powdered wall paper paste, plaster of paris, powdered ceramic glaze
Castolyte, catalyst, paper cups, parting agent, molds
Wood strips, backing, floor tile, Elmer's glue, alphabet soup--dry
Reeds: #2 and #4 round; cotton rug yarn in assorted colors, cardboard looms.
Knife, awl, coping saw, flat file, compass, abrasive paper--2/0
Hand drill, 1/8" size twist drill, wash pan or large kettle

Bibliography:

Gilbert, Harold G., Children Study American Industry. Wm. C. Brown, Co. Dubuque, Iowa, 1966.

Newkirk, Louis V., Integrated Handwork for Elementary Schools. Silver Burdett Co., New York, New York, 1940.

MANUFACTURING

Assignment: 33 Grade Level: 5-6

Title: Mixing Materials into Products and Coating Surface.

Definition: Coating surfaces is a method of preserving, decorating, or adding properties the basic material does not posses. Some widely used coating processes are painting, enameling, plating, and laminating.

Objectives: As a result of the learning experiences the students should be able to paint on surface of a board with an oil-base paint. Paint one surface of a board with a latex or water-base paint. Mix powder or tempera paint with water and paint a surface. Mix ceramic glaze with water and color bisque ware. Use spray paint to color and decorate metal objects.

Activities:

1. The student will determine the finish required for three products such as wood, metal, paper, or ceramics.
2. Student will apply tempera, latex, oil, spray, or ceramic glaze to at least one object.

Teaching Procedure:

1. Explain the reasons various materials are surface-coated.
2. Show how oil-base and water-base paints are mixed.
3. Show how various painting tools are cleaned after using.
4. Show how cleaning techniques and newly developed paints may determine the finish used.
5. Show how oil or tempera paints, latex, and others are applied.
6. Show how ceramic glaze is applied, gesso slip coloring.
7. Show how spray paint is applied.

Relationships:

1. Reading: Stories about development of finishes.
2. Art: Development of pleasing colors, color wheel usage.
3. Science: Materials and composition of coating substances.
4. Social Studies: Coating materials come from many countries.
5. Mathematics: Proportions to use for recipes, fractions, ounces, measurements.

Tools and Materials:

Paints: oil, latex, tempera, spray in assorted colors
Glazes: ceramic, in assorted colors
Brushes: oil and water, flat and round, in assorted sizes
Boards, papers, newspapers, tin cans, tuna fish cans
Bisque ware pottery, plaster castings

Bibliography:

Gilbert, Harold G., Children Study American Industry. Wm. C. Brown Company, Dubuque, Iowa, 1966, Chapter 3.

MANUFACTURING

Assignment: 34 Grade Level: 5-6

Title: Assembling Components into Sub-Assemblies and Finished Products.

Definition: Assembling components into sub-assemblies and finished products is a process where two or more pieces are brought together or assembled using various technologies of joining.

Objectives: As a result of the learning experiences the student should be able to assemble at least three components using nails, screws, or glue. List the stations and tools necessary to set up an assembly line and contrast a worker's production on an assembly line with that of the individuals production doing all the jobs.

Activities:

1. Assemble a product using 3 or more components and 2 or more techniques of joining.
2. Set up and operate an assembly line for a wooden model PT boat.
3. Assemble a link belt in leather.
4. Assemble a scrapbook using paper.

Teaching Procedure:

1. Make and explain a flow chart of assembly procedures; show necessary me methods of joining and compare them with methods used in industry.
2. Set up and explain the operation of a model work station.
3. Explain proper tool distribution and demonstrate proper tool manipulation.
4. Explain quality controls and arrange for go, no-go gages and inspectors.
5. Explain timing of operations and have an efficiency expert timing the assembly.
6. Plan an educational excusion to a local factory.

Relationships:

1. Reading: Directions, flow charts, time cards, books about factories.
2. Mathematics: Compute time cards, material and labor costs, cost per unit.
3. English: Write job descriptions, safety rules, personnel assignments.
4. Social Studies: Worker associations, Labor and Management relationship, and choosing workers for jobs.

Tools and Materials:

10 oz. claw hammer, 4" screwdriver, 6" awl, 6 T leather punch, 2 penny box nails, 4 penny box nails, Elmer's glue, 1¼-5 FH steel wood screws, rubber cement, 3/4"-18 brads.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Company, Dubuque, Iowa, 1966, pp. 83-85.

The Evolution of Mass Production, Booklet, Ford Motor Company, Educational Affairs Department, The American Road, Dearborn, Michigan, 1956.

MANUFACTURING

Assignment: 35 Grade Level: 5-6

Title: Preparing for Distribution

Definition: Preparation for distribution includes those processes that clearly mark, label, or identify, count, bag, wrap, or otherwise package or crate, a product for shipment.

Objectives: As a result of the learning experiences the students should be able to count by ones, pairs, half dozen, full dozen, and know the size of a gross. Wrap a square or rectangular shaped package. Recognize boxing and crating techniques and be able to explain the difference. Write a shipping label.

Activities:

1. Devise a package for 1 dozen small objects, ie: screws, bolts, etc.
2. Prepare a pair of needle-nose pliers or other small tools for shipment.
3. Prepare a pint jar or a tube of glue or cement for shipment.

Teaching Procedure:

1. Show how packaging is an important part of the sales economy; certain colors, shapes, and sizes are more appealing to the eye.
2. Show how the packaging must protect the contents through moving and storage and maintain quality until consumed.
3. Show how packages of various sizes and shapes are wrapped for shipping.
4. Show how some items are boxed, large items crated, and explain why.
5. Explain postage and shipping charges. Show a postal rate map.
6. Have a contest to determine the fastest and most efficient package wrapper.

Relationships:

1. Reading: Reading of directions, weights, units.
2. Science: Types of materials used in shipping.
3. Social Studies: The item, as well as its destination, (local delivery, next city, out of state, out of country, tropical, arctic, etc.) determines the necessary packaging materials.
4. Mathematics: Computation of weights, shipping charges.
5. Fine Arts: Appealing packages are a result of good design.

Tools and Materials:

Newspaper for shredding, wrapping.
Brown Kraft paper for exterior wrapping
Gummed tape, scotch tape, string.
Corrugated paper, assorted boxes, wood crate
Gummed shipping labels
Plastic cage, envelopes, other small containers
Scissors
Knife

Bibliography:

Gilbert, Harold ., Children Study American Industry. Wm. C. Brown Company, Dubuque, Iowa, 1966, p. 88.

MANUFACTURING

Assignment: 36 Grade Level: 5-6

Title: Servicing Manufactured Products

Definition: Servicing consists of installing, maintaining, repairing or altering.

Objectives: As a result of the learning experiences the students should be able to replace a light bulb, repair an extension cord; clean and oil simple hand tools; check tension on a bicycle chain, air pressure in bike tires; adjust loose wheels on a bike; replace cotter keys, lost bolts, and nuts, or screws; wax and polish woodwork and furniture; wax and polish shoes and leather goods.

Activities:

You are to choose one or two of the following:

Maintaining:

1. Adjust front cones on a bike, chain tension, air pressure in tires.
2. Clean a file, saw, letter press, ceramic bench, bike.
3. Oil a bike chain, door hinges, skates, apply soap to drawer slides.
4. Wax and polish wood, wax and polish leather, polish silver or copper.

Repair:

1. Change light bulb in a table lamp, male and female plugs on extension cord.
2. Replace cotter keys on trike, or coaster wagon, loose screws in hinges, lost bolts and nuts.

Teaching Procedure:

1. Demonstrate each small task listed as problems. Point out sequential steps if any.
2. Mention importance of correct and proper servicing.
   a. longer life of item.
   b. better service from product.
   c. more value for money involved.

Relationships:

1. Reading: How to do it books, direction sheets.

Tools and Materials:

Bolts, nuts, screws, chamois or dry absorbent cloth, cotter keys, extension cord with male and female plugs, file card and brush, gage: air pressure, tire, hinges, table lamp, oil, Silver Leaf polish, copper clean, 4" screwdriver, Kiwi wax, bar of soap, sponge, Pledge wax, Simonize wax, wood scraps for driving screws, Crescent 8" wrench.

Bibliography:

Newkirk, Louis V., and Johnson, William H., The Industrial Arts Program, The Macmillan Company, 1948, Chapter 4.

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, The Bruce Publishing Company, Milwaukee, Wisconsin, Chapter 2.

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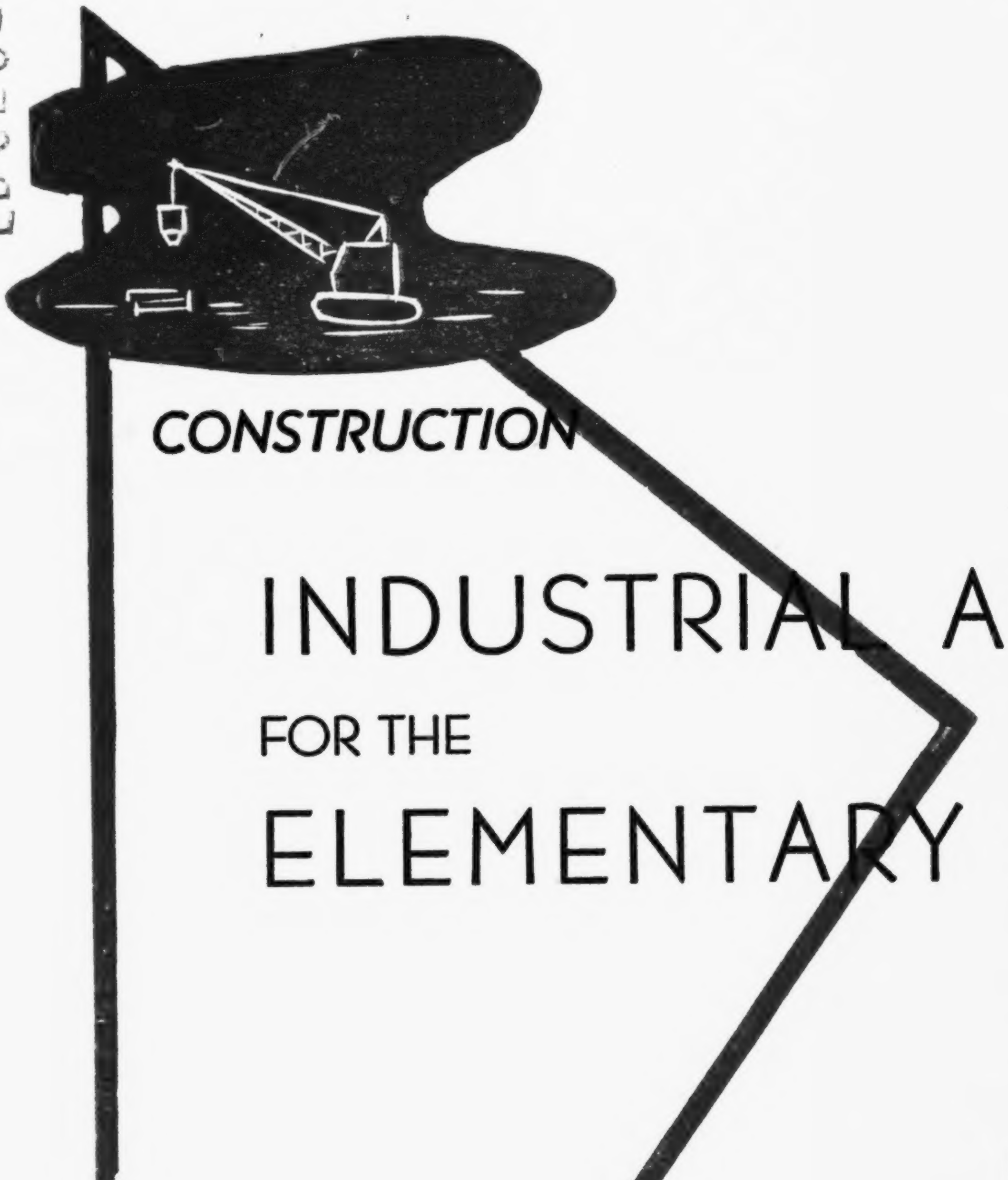
CONSTRUCTION
MANUFACTURING

INDUSTRIAL ARTS FOR THE ELEMENTARY SCHOOL

K-2

NDEA Institute for Advanced Study
The Ohio State University
1968

VT007850

Guides
in
CONSTRUCTION AND MANUFACTURING
for
Elementary School Industrial Arts

10 # Materials Developed at

Summer 1968

NDEA Institute for Advanced Study
in Elementary Industrial Arts (Columbus, Summer 1968).

The Ohio State University
Columbus, Ohio
43210

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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INTRODUCTION

This institute was specifically designed to strengthen the participants' qualifications as classroom teachers, supervisors, and teacher educators with special reference to the areas of industry and technology at the elementary school level. The program of study and the practicum experiences were designed to strengthen the participants' philosophical orientation; provide an awareness of new approache techniques, and skills; and demonstrate effective means of developing curriculum materials for elementary school pupils.

The overriding objective of the institute was to effect curriculum change in the industrial arts offerings of the elementary school. The specific objectives were: 1) to help participants increase their knowledge of industry and technology, with special emphasis on those local industries that influence childrens' everyday living; 2) to assist participants in projecting a rationale for the inclusion of industrial arts in the elementary curriculum; 3) to help participants increase their skills in writing curriculum materials and developing laboratory experience for pupils at the elementary school level; 4) to provide practicum experience through teaching selected units to pupils in an elementary school setting; and 5) to help participants gain knowledge of the rich instructional resources available from industry in the community.

One unique feature of the institute was the inclusion of classroom elementary teachers, industrial arts teachers, industrial arts supervisors, and industrial arts teacher educators. They worked together as colleagues in the institute and profited from the interaction that occured because of their difference in perspective. A second unique feature was the practicum experience with a demonstration class of elementary school pupils. Realistic classroom situations helped to ensure valid methodology and content selection.

Leaders in the profession through the AIAA, the affiliated ACESIA, and other professional organizations have long recognized the need to develop meaningful programs for elementary schools that reflect the contemporary industrial and technological society in which young children live. This institute helped to further the renewed interest that has been shown in elementary industrial arts. Extended effort is required if industrial arts activities are to find their appropriate place in a well-balanced elementary school program.

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PREFACE

These guides for the elementary grades K-6 were developed by the twenty-five participants under the guidance of a staff of specialists in industrial arts. Each of the booklets was developed and organized by grade levels K-2; 3-4; 5-6 and encompassed material listed under the headings of construction and manufacturing. Each participant was responsible for the development of a share of the lessons, when totaled amounted to seventy-two in all. Each participant as nearly as possible developed guides in his major area of interest and on the grade level of his choice.

The general approach used by each group was common and was based on lectures by staff and visiting lecturers, group discussions and the experiences that were a result of working with the elementary students at the University School.

These guides are in no way intended to limit the teacher's class activities but rather to serve as a direction or approach to aid in the development of other guides to meet the needs of the classroom situation. It is hoped that these experiences will spark the imagination of the teachers so that they will attempt new and better ways of interpreting industry to the elementary school students. In the case of administrators it is hoped that they will provide their own staff the opportunity to implement a program in elementary school industrial arts and encourage the staff to do so. The teacher educators have increased their base on which to interpret the vast systems of construction and manufacturing to future teachers.

Victor W. Hoffman, Director
NDEA Institute for Advanced
Study in Elementary Industrial
Arts. Summer 1968

K-2

Other Instructional Materials

In This Series

3-4
5-6

CONSTRUCTION

CONSTRUCTION

Assignment: 1 Grade Level: K-2

Title: Man and Technology

Definition: Technology is the record of man's achievements in materials, techniques and skills and is the means by which man efficiently produces the goods to meet his needs.

Objectives: As a result of the learning experiences the students should be able to recognize the progress of man's achievements in simple basic steps from caveman to the present. The student should be able to identify the term technology as the means by which man produces goods to meet his needs.

Activities:

1. Participate in a visit to a museum depicting the progress of man at different levels.
2. Discuss the museum visit with as much free communication from the children as possible, emphasizing the new term "technology".
3. Draw a mural depicting some basic steps from caveman to the present.
4. Role play the progress of man through the ages.

Teaching Procedure:

1. Begin activity 2 with the children seated on the floor in an informal manner.
2. Invite the comments relevant to the museum visit. Tie the comments into order by use of visual aids until the pattern of progress in technology emerges.
3. Introduce the term technology and its relationship to the progress of man and use if often during the discussion.
4. Go from this duscussion to the role playing activity.

Relationships:

1. Manuscript writing: Use the term technology to describe the progress made in each students skill toward better penmanship.
2. Citizenship: Discuss the progress made toward more civilized behavior as the classroom rules are better kept.

Tools and Materials:

Pictures depicting various stages of technical progress from the time of the caveman until now. Stone ax, spear, horse drawn cart or wagon, log cabin, coal stove, telephone, car, modern type house.

Bibliography:

Olson, Delmar W., Industrial Arts and Technology, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1963, pp. 31.

Bennett, Edward, Degan, James. Spiegel, Joseph, Human Factors in Technology, McGraw-Hill Book Company, Inc., New York, 1963, pp. 3.

CONSTRUCTION

Assignment: 2 Grade Level: K-2

Title: Construction Technology

Definition: Construction technology is the knowledge of how to use tools and techniques to build an object.

Objectives: As a result of the learning experiences the students should be able to learn the function and use of a set of basic tools; demonstrate the technique in constructing a simple box.

Activities:

1. Demonstrations of how to use the tools properly and their function.
2. Practice and experimentation with the individual tools in miscellaneous sawing, drilling, hammering, etc. without any construction in mind.
3. Individual help with faulty techniques to correct and improve the children's ability will be stressed.
4. Discuss the design and plan of a simple box, letting the children bring out ideas for the varied use of the box.

Teaching Procedure:

1. Begin the discussion with the children answering the question as to; what a box is; how many "boxes" can they see in the classroom; and how many things they can think of that is a basically a "box". As far as practical, the "boxes" mentioned in the classroom should be assembled together and the children allowed to study and observe how each one is constructed.
2. These differences should be discussed as well as the terms "square", "dimension", "measurement", "surface", "fit" and so forth.
3. A demonstration by the teacher showing how a simple box can be put together using pre-cut material with careful explanation of why each step must be taken and the results if this is done improperly.

Relationships:

1. Mathematics: Measuring exercises to increase degrees of accuracy.
2. Science: The boxes made by the children could be used for seed flats, relief, maps, terrariums, conservation projects and other science projects that require the use of a box.
3. Social Studies: Diorams, scale model communities, play houses.
4. English and Communication: Shadow box, serial box.
5. Art: Designing and planning alterations or changes to their box to make useful and decorative craft projects, paint and equipment holders.

Tools and Materials:

Plywood, nails, glue, clamps, surform, hammers, sandpaper.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, The Bruce Publishing Company, Milwaukee, 1959.

CONSTRUCTION

Assignment: 3 Grade Level: K-2

Title: Applying Technology to People

Definition: Technology has elevated man by allowing him to create his own environment, control natural forces and achieve freedom from enslavement.

Objectives: As a result of the learning experiences the students should be able to give two illustrations of how technology has elevated man (relating this to the field of construction); list two considerations of shelters for man in North America.

Activities:

1. Discuss with the children how man has constructed many types of shelter and some of the ways he has controlled forces for his comfort.
2. Let the children share examples they have noticed and their feelings toward this comfort.
3. A visit to different utility operations.
4. Visits to construction projects in different stages of completion.
5. A progressive mural of the community adding the buildings as they are visited.

Teaching Procedure:

1. Gather pictures of different type structures - a home, school, department store, hotel, grocery store, church; as well as animals in their natural habitat.
2. Present the pictures of a home and invite discussion by asking related questions: where would we live if there were no homes and buildings to live in?
   a. At the appropriate time show homes of animals and discuss how they have constructed a place to live and adapted to nature.
   b. Show how man has constructed a place to live and how he has adapted nature to fit his comforts.
3. Discuss other types of structures and their role in the community.

Relationships:

1. Language Arts: Developing confidence and ability to express themselves as well as relating ideas to a theme.
2. Science: The study of animals in their natural habitat.
3. Social Studies: The community and its internal relationships.
4. Art: The ability to express their ideas through a sketch or drawing.

Tools and Materials:

Pictures of structures, nature pictures of animals in their natural habitat, charcoal, poster paint and brushes.

Bibliography:

Olson, Delmar W., Industrial Arts and Technology, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1963.

CONSTRUCTION

Assignment: 4

Grade Level: K-2

Title: Managing Technology

Definition: Managing technology is the systematic consideration and practical application of concepts and objectives to accomplish specific industrial goals that may be stated in terms of performance.

Objectives: As a result of the learning experiences, the student should be able to select suitable materials to use in constructing a play store.

Activities: You are to select materials to use in constructing a play store from among a wide range of possible materials; physically examine all material samples; use hand tools to determine the practical construction qualities of each material.

Teaching Procedure:

1. The teacher will assemble a group of varied construction material types. The physical qualities of each will be determined through demonstrations that involve hand tool application such as pounding, bending and cutting with a hand saw.
2. Have pupils carry out the same hand tool applications. The physical properties of each material will determine its selection for the project.

Relationships:

1. Language Arts: An experience chart would be used to list group conclusions.
2. Arithmetic: Concepts of measurement will be initiated and considered.

Tools and Materials:

Saw
Hammer
Nails
Woods
Cardboards

Bibliography:

Browne, Sibyl. Art and Materials for the Schools. New York: Reliable Press, Inc., 1943, Chapter 2.

CONSTRUCTION

Assignment: 5 Grade Level: K-2

Title: Beginning the Project

Definition: Beginning the project is the initiation of any or all of the component legal and material units that will be combined to form the completed project.

Objectives: As a result of the learning experiences, the student should be able to identify materials suitable for use in constructing a play store.

Activities: You are to begin the project by requesting five needed materials by name. The materials will be available for pupils to physically examine by using hand tools.

Teaching Procedure:

1. The materials will be used (examined) by the pupils, using the tools provided.
2. Instruct the pupils to pound and cut as they wish.
3. Through discussion, the teacher will bring out conclusions about the properties of the materials.

Relationships:

1. Language Arts: Words that are the names of the material types will be recorded on a continuing experience chart. Earlier entries will be reviewed.
2. Science: Physical property differences will be discussed. ie: Why am I able to tear tag board and unable to tear wood?

Tools and Materials:

Saws
Hammers
Woods
Tag board
Construction paper

Bibliography:

Randall, Grace A. Things to Make In Arts and Crafts. Darien Conn. The Educational Publishing Corp., 1947, pp. 5-6.

CONSTRUCTION

Assignment: 6 Grade Level: K-2

Title: Selecting a Site

Definition: Selecting a site is making a positive decision to use a definite geographic area for a specific purpose.

Objectives: As a result of the learning experiences, the student should be able to select a section of the classroom floor area that is within the area of minimum traffic pattern within the room.

Activities: You are to designate at least two places in the self-contained classroom where there is little walking traffic. The space needed is approximately 16 square feet. Pupils may draw a floor plan of their classroom. The best single location will then be selected.

Teaching Procedure:

1. The teacher will draw an outline of the classroom floor plan on the chalkboard. The areas of maximum and minimum traffic will be identified through group discussion.
2. Pupils will be asked to walk where they "often" walk. The remaining areas, in this way, will be identified.

Relationships:

1. Geography: The concept of map will be introduced.
2. Arithmetic: With selected pupils, scale drawing would be attempted.

Tools and Materials:

Chalkboard
Chalk
8 1/2 x 11 paper

Bibliography:

Olson, Delmar W., Industrial Arts and Technology. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1963.

CONSTRUCTION

Assignment: 7 Grade Level: K-2

Title: Surveying and Mapping and Soil Testing

Definition: Surveying is to study a land site to determine boundaries, elevations, depressions and other factors that might affect the land usage.

Soil Testing is the performing of various tests on the soil of a land site that might indicate some affect on how the land is to be used.

Objectives: As a result of the learning experiences the students should be able to recall that land to have some type of construction must be surveyed; build a simple structure within a given area; identify different types of structures.

Activities:

1. Examine pictures and drawings of different types of structures.
2. Discuss how they are built on different terrains and how the structures vary in size and shape.
3. Select a project that will show how a site is measured (surveyed) for a simple structure.

Teaching Procedure:

1. Have a display of different types of structures (models and/or pictures). They should show various stages of completion.
2. Discuss differences in the size of area, types of terrain, and size and types of structures.
3. Decide on a place in the room where a building block structure could be built.
4. Make a sketch, on the board or drawing paper, of the room and space to be used.
5. Measure and mark out a space. Have the children assist when possible.

Relationships:

1. Social Studies: Study of neighborhood.
2. Mathematics: Measurements.
3. Art: Special relationships.

Tools and Materials:

Yard stick, marking instrument.

Bibliography:

-----------------, How-To-Do-It-Encyclopedia, Golden Press, New York, 1961, Volume 8, p. 190.

CONSTRUCTION

Assignment: 8

Grade Level: K-2

Title: Designing the Construction Project

Definition: Designing is finding a solution to a problem through identifying the problem, developing preliminary ideas, analyzing possible solutions, and deciding upon a solution to be implemented.

Objectives: As a result of the learning experiences the students should be able to design a simple building block structure; follow and tell the steps of designing a structure.

Activities:

1. Plan and design a simple block structure in accordance with materials and space available.
2. Draw a sketch on board or paper.
3. Build block structure according to plan.

Teaching Procedure:

1. Discuss and decide upon a building block structure.
2. Sketch a design on board or paper and modify it to include group suggestions.
3. Build a structure according to the design.

Relationships:

1. Mathematics: Measuring.
2. Art: Drawing a sketch of the structure.

Tools and Materials:

Drawing paper, building blocks.

Bibliography:

Townsend, Gilbert, and Dalzell, J. Ralph, How to Plan a House, American Technical Society, Chicago, 1958, pp. 102-137.

CONSTRUCTION

Assignment: 9 Grade Level: K-2

Title: Steps in Designing and Engineering a Construction Project

Definition: The steps in designing with an understanding of the type of structure to be designed requires preliminary drawings, each showing a different approach, analyzed to consider aesthetic and practical applications and then refined for selection.

Objectives: As a result of the learning experiences the students should be able to describe the steps of designing a simple block structure; design a simple block structure; following a design build a block structure.

Activities:

1. Discuss and decide ona simple building block structure.
2. Draw and design a block structure.
3. Build a structure according to the design.

Teaching Procedure:

1. Discuss and decide on a simple block structure.
2. Draw sketches and design a structure.
3. Establish measurements and mark it out on the determined space.
4. Build structure using available blocks and accepted design.

Relationships:

1. Mathematics: Measurements.
2. Art: Draw picture of structure.

Tools and Materials:

Paper, chalk, masking tape, yardstick, building blocks.

Bibliography:

Townsend, Gilbert and Dalzell, J. Ralph, How To Plan A House, American Technical Society, Chicago, Illinois, 1958, pp. 102-137.

CONSTRUCTION

Assignment: 10

Grade Level: K-2

Title: Planning and Drawing

Definition: Planning and drawing is the process of making a drawing to show how an object should appear after construction.

Objectives: As a result of the learning experiences the students should be able to make a simple line drawing showing a floor plan layout for a playhouse; make a simple line drawing showing the front view of the outside of a playhouse.

Activities:

1. Draw on paper the floor plan layout for a three room playhouse with a living room, kitchen and bedroom.
2. Use crayons to make each room on the plan the color it should be painted.
3. Draw on paper a front view showing how the playhouse will appear from the outside.

Teaching Procedure:

1. Discuss with students the three basic areas of a home, living area, dining area and sleeping area.
2. Using a flannel board and colored cut outs, illustrate how each of the areas is represented by rooms.
3. Move the flannel cut outs to show how different room arrangements can be made.
4. Assign to students the problem of drawing a floor plan layout for a playhouse which could be built in the classroom.

Relationships:

1. Social Development: Family life and home planning.
2. History: Types of homes in man's history.
3. Mathematics: Simple proportion and geometry.

Tools and Materials:

Paper, pencil, crayons, flannel board.

CONSTRUCTION

Assignment: 11

Grade Level: K-2

Title: Selecting a Builder

Definition: Selecting a builder is the process of judging which person is best qualified to perform the needed construction.

Objectives: As a result of the learning experiences the students should be able to tell a story about how construction trades work together to build a house.

Activities:

1. View the motion picture, "Building a House".
2. Study a doll house and discuss the worker needed to do the various types of construction on a house.

Teaching Procedure:

1. Discuss with students how many types of trademen are needed to build a house.
2. Show the motion picture "Building a House" and follow with discussion.
3. Have students study a doll house and tell a story about how men would be used to build a real house like the doll house.

Relationships:

1. Social Development: Working together.
2. English: Sentence structure and grammar.

Tools and Materials:

Motion picture "Building a House", motion picture projector, doll house.

Bibliography:

Gilbert, Harold G., Children Study American Industry, William C. Brown Co., Dubuque, Iowa, 1966.

Assignment: 12 Grade Level: K-2

Title: Listing Materials

Definition: Listing materials is the process of making a complete list of all items required to construct an object.

Objectives: As a result of the learning experiences the students should be able to make an oral or written list of the materials needed to construct a model house with building blocks.

Activities:

1. From a supply of building blocks, select the sizes and shapes of blocks needed to construct a small model house.
2. Group the types of blocks and stack each group together.
3. Count the number of blocks in each group.

Teaching Procedure:

1. Explain to students the importance of knowing how much material is needed to construct an object.
2. Show the students a drawing of a model house constructed with building blocks.
3. Have the students select the appropriate blocks, group them into simular sizes and shapes, count the groups, and report the numbers.
4. List the materials on the chalkboard.
5. Allow the students to build the model house.

Relationships:

1. Mathematics: Geometric shapes and sizes, counting.

Tools and Materials:

Assortment of building blocks, drawing of model house built with blocks.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Co., Milwaukee, 1959.

CONSTRUCTION

Assignment: 13 Grade Level: K-2

Title: Collective Bargaining, Handling Grievances

Definition: Collective bargaining is a method of negotiating for the settlement of questions of hours, wages, working conditions, fringe benefits, etc. between employers and employees.

Objectives: As a result of the learning experiences the students should be able to explain the difference between collective bargaining and an individual bargaining separately for improved working conditions; explain two reasons or needs for handling grievances.

Activities:

1. Use role playing to resolve a student grievance on the amount of time to be spent for playtime, music, and art.
2. Use role playing to draw up as collective bargaining contract concerning the wearing apparel to wear on the playground during snowy and raining weather and undesireable games and desireable games to play on the playground.

Teaching Procedure:

1. A student forgets to wear his boots out for recess on the playground.
2. A student injury occurs due to an undesireable game played at recess.
3. A student has his clothes get diry during recess.
4. The teacher then uses this occasion for the entire class to draw up acceptable playground procedures (a contract) through the use of collective bargaining procedures.

Relationships:

Social Studies: Learning how people must get along with each other.

Bibliography:

World Book Encyclopedia, Field Enterprises Educational Corporation, Chicago, Illinois, 1965, pp. 2-17, Volume L.

Scott, William G., The Management of Conflict; Appeal Systems in Conflict, Homewood, Illinois, 1965, p. 29.

CONSTRUCTION

Assignment: 14 Grade Level: K-2

Title: Hiring Construction Personnel, Training and Educating for Construction, Working Conditions, Advancing in Construction.

Definition: The hiring of qualified people to do construction work. The training and educating these people to perform their tasks in a desireable manner under adequate present day working conditions so they can move up the "ladder of success."

Objectives: As a result of the learning experiences the students should be able to explain the reason for acceptable training and education; explain the difference between satisfactory and unsatisfactory working conditions; identify 3 ways construction personnel can advance to a better position; and discuss 2 common practices used for hiring construction personnel.

Activities:

1. Role playing activity - students having their own road building construction firm.
2. Role playing activity - students having their own home building construction firm.
3. Students build a launching pad and rocket site.

Teaching Procedure:

1. Students set up their own construction firm, hire construction personnel, discuss their working conditions, and how they can advance in their jobs.
2. The students then build a model farm, roads, and buildings. This can be done by using wood, paper, sand, and other articles found in the classroom.

Relationships:

1. Social Studies: Learning how people work together in industry.
2. Art: Need for design in construction.
3. Science: Learning the basic principles of jet propulsion and rockets.

Tools and Materials:

Paper, scissors, wood, hammer, nails, saw, and sand.

Bibliography:

Cohen, B., Working Conditions and Employee Services, Institute of Labor and Management, 1945, p. 87.

Weinland, James D., Personnel Interviewing, Ronald Press, 1952.

CONSTRUCTION

Assignment: 15 Grade Level: K-2

Title: Construction Production Technology

Definition: Construction production technology is the changing of the form of material through combining, forming, and separating them on the site.

Objectives: As a result of the learning experiences the students should be able to explain two methods of combining that are used in a building on the site; explain the terms combining, forming, and separating materials; name one post processing process that is done around the home.

Activities:

1. Model clay animals or clay dishes.
2. Assemble simple plastic model kit.
3. Have the students form anything of their choice out of play dough.

Teaching Procedure:

Demonstrate to students how to make an animal out of modeling clay.

Relationships:

Art: Learning about form and design.

Tools and Materials:

Modeling clay or play dough, model kit.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Company, Milwaukee, 1959.

Moore, Hamberger, Kingzett, Handcrafts for Elementary Schools, D. C. Heath Co., Boston, 1953.

CONSTRUCTION

Assignment: 16 Grade Level: K-2

Title: Clearing the Site and Getting Ready to Build.

Definition: Is that process whereby the removal of trees, stones, excess dirt, is accomplished by the use of earth digging machines and other tools relating to this operation.

Objectives: As a result of the learning experiences the students should be able to organize their activities on a scale model with tools and equipment and do practical work in clearing the site with earth moving equipment.

Activities:

1. You are to fill the sand box with small branches and sticks, then have the children begin removing the obstructions with their toy models.
2. Build paper models of earth moving equipment out of card board.
3. Make a model building diorama type of construction site.

Teaching Procedure:

1. Have the children scatter the debris around the sand box and disarrange the sand piles.
2. Using small bulldozers and related equipment begin clearing the site.
3. Lay out the roads and home sites.
4. Deceide where these home sites are to be located and plot them on the chalkboard.
5. Plan a walking visit to a construction sit to observe it being cleared.

Relationships:

1. Health and Safety: Have the students draw pictures of some safety rules they have observed on this operation.

Tools and Materials:

Sand, sand box, toy models of machines, twigs, branches, stones, various types of soil.

Bibliography:

Gerbracht and Babcock, Industrial Arts for Grades K-6, Bruce Publishing Company, Milwaukee, Wisconsin: 1959, Chapter 4.

CONSTRUCTION

Assignment: 17

Grade Level: K-2

Title: Locating the Structure

Definition: Locating the structure is that part of planning where the various conditions are considered and all specifications are met regarding zoning, building codes, and surveying a particular site.

Objectives: As a result of the learning experiences the students should be able to construct a simple birdhouse from a plastic bleach bottle; locate this birdhouse in the best possible place.

Activities:

1. Using a plastic bleach or detergent bottle, make a simple birdhouse.
2. Locate a suitable spot in the school yard to place this birdhouse.

Teaching Procedure:

1. Build a simple birdhouse using a plastic bottle from bleach or detergent.
2. Mark off with a "magic marker" the desired location for the door.
3. Discuss appropriate locations for birdhouses taking into account safety, shelter, and accessability.

Relationships:

1. Social Studies: Make a study of birds in your area and study some of their characteristics.

Tools and Materials:

Empty detergent bottles (plastic), scossors, "magic marker" pen.

Bibliography:

Gerbracht, Carl and Babcock, Robert, Industrial Arts for Grades K-6, Bruce Publishing Co., Milwaukee, Wisc., 1959, Chapter 2.

CONSTRUCTION

Assignment: 18

Grade Level: K-2

Title: Earthmoving

Definition: Earthmoving is that process where material characteristics of soil and rock is changed by the removal of spoil or loose materials from the site.

Objectives: As a result of the learning experiences the students should be able to solve a process of earth moving common to all building sites.

Activities:

1. Transport sand from a site to a sand box by using sand pails.
2. Grade this sand by sifting it to remove larger stones and twigs.

Teaching Procedure:

1. Organize the class in various groups to move the sand.
2. One group of children to be in charge of screening the sand while the others transport it.
3. Form two piles of sand, one screened, the other full of stones.
4. Level out the screened sand and then lay out a small scale village in the play area.

Relationships:

1. Social Studies: Construct paper house, churches, roads and vehicles.
2. Science: Test various soils for water penetration. Collect samples of soils.

Tools and Materials:

Sand, sand pails, sand shovels, fine mesh screen.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Company, Milwaukee, 1959, Chapter 4.

CONSTRUCTION

Assignment: 19

Grade Level: K-2

Title: Classifying Structures.

Definition: Classifying structures is the analyzing and grouping of constructed projects, based on intended use and the principal material used to construct them.

Objectives: As a result of the learning experiences the students should be able to identify three different kinds of buildings, such as the post office, grocery store, offices, and homes; understand and identify two requirements of city and state owned buildings.

Activities:

1. Visit the local fire station and post office, observe the type of architecture and the kinds of building materials used in construction.
2. Cut pictures from magazines which represent buildings in which postmen, firemen, and policemen work.

Teaching Procedure:

1. Construct a play post office.
2. Paint the post office to conform to the one visited.
3. Compare time required for long and short distance deliveries by sending local and long distance parcels. (use of the building)

Relationships:

1. Writing: Class composition of letters.
2. Art: Decorating the post office.
3. Numbers: Days (time).

Tools and Materials:

Paper, pencil, chalk, cardboard, large box, paint brushes, scissors, saws, hammer, small nails, woodstrips.

Bibliography:

Newkirk, Louis V., Integrated Handwork, Silver Burdett Co., New York, 1940, pp. 257-266.

CONSTRUCTION

Assignment: 20

Grade Level: K-2

Title: Setting Foundation Forms Containing Reinforcements.

Definition: Setting foundation forms containing reinforcement features is the locating and positioing of structured temporary supports for concrete, into which permanent strengthening materials have been placed.

Objectives: As a result of the learning experiences the students should be able to make a simple form; place reinforcement materials in a form; and place form securely for the pouring operation.

Activities:

1. Make a miniature boat anchor.
2. Make a paper weight.
3. Make a simple flower vase.
4. Make a hand impression.

Teaching Procedure:

1. Discuss the idea to determine a desireable size for the anchor.
2. Select a suitable object to use as a form - dowel rod.
3. Form clay around the dowel to form a cavity in the clay.
4. Let clay cure or dry.

Relationships:

1. Mathematics: Count form. Count eye hooks.
2. Social Studies: Team work - group activity.
3. Reading - Writing: Compose an experience story.

Tools and Materials:

Dowel rod, eye hooks, clay, sand paper, saw.

Bibliography:

Olson, Delmar W., Industrial Arts for the General Shop, Prentice-Hall, Inc., New Jersey, 1961, pp. 292-295.

Assignment: 21 Grade Level: K-2

Title: Completing Foundations by Mixing, Placing and Finishing Concrete

Definition: Completing foundations by mixing, placing and finishing concrete is pouring concrete into forms and finishing the surface as the use dictates.

Objectives: As a result of the learning experiences the students should be able to place concrete in a form; level and smooth the top surface of the concrete to a specified smoothness; mix a "ready-mix" adding water and shake; contribute two experiences for a chart, with teacher doing the writing.

Activities:

1. Make a paper weight.
2. Make a wheel of concrete.
3. Make a cone of concrete.
4. Watch a "ready-mix" truck place concrete in a form.

Teaching Procedure:

1. Form clay around the bottom of a drinking glass.
2. Cut clay about one inch from the bottom of glass.
3. Allow clay to dry.
4. Mix concrete (use ready-mix - add water).
5. Place concrete.
6. Smooth top surface.
7. Add decorations - marbles, chipped glass, coloring or initials, if desired.

Relationships:

1. Mathematics: Measuring - shapes.
2. Art: Work with clay. Decorating project.
3. Social Studies: Working together.
4. Writing: Development of experience chart.

Tools and Materials:

Clay, drinking glass, "ready-mix", water, screeding tool, and decorating materials.

Bibliography:

Olson, Delmar W., Industrial Arts for the General Shop, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1961, pp. 292-295.

CONSTRUCTION

Assignment: 22

Grade Level: K-2

Title: Building Superstructures

Definition: The construction of an architectural unit, above or below the ground, designed to rest upon and be bonded to a foundation.

Objectives: As a result of the learning experiences the students should be able to identify that part of a structure that rests on a solid base.

Activities:

1. Build your house, on an existing base, out of large building blocks.
2. Build our school, on an existing base, out of large building blocks.
3. Have children play as mail delivery to structures they build.

Teaching Procedure:

1. Emphasize the concepts of rows, stacking in layers, high, low, right, left, front, back, and base(floor or table).

Relationships:

1. Mathematics: Develop concept of size and measurements.
2. Social Studies: Study types of houses in the vicinity.

Tools and Materials:

Large blocks, large used stamped envelopes, paper bag for mail sack, stapler, magic marker or crayons.

CONSTRUCTION

Assignment: 23 Grade Level: K-2

Title: Building Mass and Masonry Superstructures and Frames

Definition: Constructing that part of a structure, which is bonded to and rests on a solid base, by joining together preformed units or by moulding materials into a desired shape.

Objectives: As a result of the learning experiences the students should be able to differentiate between frames or superstructures that are shaped by casting from those that are built from preformed units.

Activities:

- From the pictures that will be shown tell which buildings are made of concrete and which ones are made from brick or stone.

Teaching Procedure:

1. Emphasize the concept of superstructures above the ground, and substructure, below the ground.
2. Using an opaque projector to show pictures of structures and have children identify the material needed.

Relationships:

- Readiness: List and compare structures in the community, such as home, school, town hall, or city hall.

Tools and Materials:

Mounted prints, opaque projector with transparencies.

Bibliography:

-----------------, Portland Cement: What It Is and What It Does. Portland Cement Assn., Boston, Mass., Pamphlet E-102.

CONSTRUCTION

Assignment: 24

Grade Level: K-2

Title: Erecting Steel Frames

Definition: Erecting the steel frames consists of building the steel skeletons of structures.

Objectives: As a result of the learning experiences the students should be able to describe the construction process of a steel framed structure.

Activities:

Build a lighthouse from large tin cans.

Teaching Procedure:

1. Build a lighthouse frame from large tin cans, number 10 or larger.
2. Stack in layers high enough so that the children will have to use a small step ladder to place the top layers. A flashing lantern could be placed on top to add interest for the children.

Relationships:

1. Readiness: Counting the number of layers, cans in each layer. Concept of "more than" and "less than".
2. English: Words - lighthouse, pile, layers, high and low.

Tools and Materials:

Large tin cans, flashing type lantern, step stool or ladder.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Company, Dubuque, Iowa, 1966, pp. 124-129.

CONSTRUCTION

Assignment: 25 Grade Level: K-2

Title: Building Wood Frame Superstructures

Definition: The wood superstructure of a house consists of that part of the house located above the basement foundation. One of several framing methods may be employed in constructing the various sills, floors, roofs, walls, ceilings, doors, and windows, depending on the type and style of house being built and the area of the country in which it is located.

Objectives: As a result of the learning experiences the students should be able to assemble a house using formed pieces, identify the walls and roof of a house, and sketch a picture of a house with walls and roof.

Activities:

1. From preformed pieces which would include 4 walls and two roof sections the student would assemble these to form a house with a gable roof.
2. Have the students draw a picture of a house including the alls, roof, and chimney.
3. Have the students cut out a pattern that the teacher had previously drawn on paper and fold and paste it together to form a simple gable roofed house.

Teaching Procedure:

1. With the use of building kits or preformed wall and roof sections have the child build a house that will stand by itself including four walls and a complete roof.

Relationships:

1. Social Studies: The house could be a log cabin or whatever type would lend itself to a study of a historical period of time. The house could be called a depot and included in a study of transportation.
2. Mathematics: A study of geometric form. Count the number of walls, windows, doors, etc..
3. Science: Talk about nails and how they hold a house together and compare this with how the log cabins were held together.

Tools and Materials:

Kit of materials including walls and roof sections of wood which, when combined properly, will form a house.

Bibliography:

Case, Bernard, The Story of Houses. New York: Sterling Publishing Company Inc., 1957.

CONSTRUCTION

Assignment: 26 Grade Level: K-2

Title: Instllation of Heating and Air Conditioning Utilities

Definition: The heating and air conditioning utilities of a building are those items added to a building which help in making it more useful and functional in terms of comfort and performance.

Objectives: As a result of the learning experiences the students should be able to read a thermometer, set a thermostat, and distinguish between hot and cold on a thermometer.

Activities:

1. With the use of an indoor-outdoor thermometer mounted in the classroom window, read its temperatures; also, read the setting and thermometer of the room thermostat.
2. Visit the school heating plant and air conditioning system and compare it with the type of heating or air conditioning system that the child reports he has at his own home.

Teaching Procedure:

1. Have a sheet showing different temperatures on pictures of thermometers and discuss how these readings are taken, having them actually read them.
2. Have the students read an indoor-outdoor thermometer and also room thermometer located on the thermostat, for a week circling correct number on a sheet provided for this purpose.
3. Discuss how temperatures can vary in a room and why.
4. From sample thermostats have the students set these according to proper room temperatures and explain what a normal setting would be.
5. Have them measure the temperature of snow or ice and make certain they know which number is warmer or larger and which is colder on the thermometer.

Relationships:

1. Science: Boil water, measure its temperature, and observe heat waves rising. Reading of thermometers or scientific apparatus.
2. Mathematics: Subtract the outdoor temperature from the indoor temperature and get the difference in temperature.
3. Social Studies: Explain how temperature effects people in how they live or make a living.

Tools and Materials:

Obtain old thermostats from a heating concern, indoor-outdoor thermometer, produce an 8½"x11" sheet picturing various readings on a thermometer, several thermometers.

Bibliography:

Arnold, Pauline and White, Percival, Homes America's Building Business, New York, Holiday House, Inc., 1960, pp. 237-249.

Emerick, Robert H., Heating Handbook, New York, McGraw-Hill Book Co., 1964.

CONSTRUCTION

Assignment: 27 Grade Level: K-2

Title: Installation of Plumbing and Piping Systems

Definition: Installation and construction of plumbing and piping utilities affects directly the intended usefulness of a building. The purposes of these systems may be many and varied but typically might include the transportation of waste products, raw materials, or finished products.

Objectives: As a result of the learning experiences the students should be able to construct a geometric form by joining together plastic pipe and fittings.

Activities:

1. Join together various fittings, nipples, and short pieces of plastic pipe to make a geometric pattern corresponding to one already drawn on paper.
2. Using rubber tubing and two glass beakers at different heights, siphon water from the higher to the lower one.

Teaching Procedure:

1. Show the students how the pipe fittings can be assembled into various patterns to form objects or geometric patterns. A simulated periscope might be one example.
2. During the time when milk is being served or by discussion, talk about the transporting of liquids by pressure or suction and use as an example; their use of a straw in obtaining their milk or pop from a bottle. Siphon water between two beakers with rubber tubing.
3. Have the students relate how water is piped to their houses and where it is obtained.

Relationships:

1. Mathematics: Geometric forms.
2. Science: Suction or pressure on liquids and plastic material uses.
3. Social Studies: How a city obtains its water from a well or other source, comparing this with colonial times.

Tools and Materials:

Some form of beverage and some plastic straw, small sizes of plastic pipe fittings and pieces of pipe, several glass beakers and rubber tubing.

Bibliography:

Woolgar, William J., Plastics in Plumbing, New York, Hutchinson Technical Education, 1963.

Arnold, Pauline, and White, Percival, Homes: America's Building Business, New York, Holiday House, Inc., 1960, p. 223.

Assignment: 28

CONSTRUCTION

Grade Level: K-2

Title: Installing Electrical Power and Communications Systems.

Definition: Installing electrical power systems consists of outside work done by lineman, inside work by wireman, while communications workers install manufactured products.

Objectives: As a result of the learning experiences the students should be able to compare different metal objects that will be attracted by a magnet; to differentiate between battery power and electric power; to recite safety precautions necessary around electrical outlets.

Activities:

1. An aquarium fish pond game.
2. Construct an electromagnet.
3. The metals filing beard game.

Teaching Procedure:

1. Obtain an aquarium and fill with water.
2. Manufacture little metal fishes of copper, brass, aluminum, tin and iron.
3. Attach a piece of string to a one-fourth inch dowel rod.
4. Attach string to magnet.

Relationships:

1. Mathematics: Count the number of fish taken from the aquarium.
2. Language Arts: Follow verbal instruction. Make an experience charts and relate principles of electricity.
3. Social Studies: Study occupations related to the electrical industry.
4. Science: How electricity is conducted three a wire.

Tools and Materials:

Back saw, coping saw, string, scissors, tagboard, dowel rod, tin, copper, aluminum, iron, brass, small horseshoe magnet, iron filings.

Bibliography:

Beeler, C., Experiments With Electricity, Thomas Crowell Co., New York, New York.

Epstein, The First Book of Electricity, Franklin Watt Publishing Co., New York, New York.

CONSTRUCTION

Assignment: 29

Grade Level: K-2

Title: Making Inspections

Definition: Inspection in the construction industry is the careful examination of the work being done to see if it meets written specifications, plans, federal, state and local codes.

Objectives: As a result of the learning experiences the students will be able to identify the location of your station for clothes and overshoes; to record the number of electrical outlets in the classroom; to compare good general housekeeping at home and the school; and to identify a fire extinguisher and its purpose in fire control.

Activities:

1. Role playing the occupation of an inspector.
2. Tour the building and inspect the fire escapes.
3. Examine the walls for cracks and offer suggestions as to what can be done for its correction.

Teaching Procedure:

1. Inspect your own room at home and list the number of doors, windows and lights.
2. Demonstrate each small task listed as an objective and elaborate on the importance of each.
3. List the safety precautions to be used around the home and school.
4. The importance of repeating performances in establishing proper motor control.

Relationships:

1. Mathematics: Experience in counting and adding various items in the room.
2. Language Arts: Follow verbal instructions. Invite and speak with the fire inspector.
3. Social Studies: Study occupations related to the construction industry (inspectors).

Tools and Materials:

Charts, abacus.

Bibliography:

Zim, Herbert S., Things Around The House, Wm. Morrow and Company, New York, 1954.

Assignment: 30 Grade Level: K-2

Title: Mediation, Arbitration and Striking

Definition: A strike occurs when labor and management are unable to settle their differences. Mediation is accomplished by friendly intervention of a third party. Arbitration is the settlement of a dispute by persons chosen to hear both sides and come to a binding decision.

Objectives: As a result of the learning experiences the students should be able to identify the role of a third party to settle differences of opinion; to list the rules each party is to follow to settle a dispute.

Activities:

1. Have students role play the part of the mediator, arbitrator and striker.
2. Implement a realistic situation (an argument) occuring in class and explore with the children amicalbe settlement.
3. Implement rules for safe playground conduct.

Teaching Procedure:

1. Discussion on differences of opinion, arguments and emphasize the importance of being able to accept other children's ideas.
2. Relate discussions to adults and as to how they go about settling differences.
3. Explain rules governing behavior in the classroom.

Relationships:

1. Language Arts: Follow verbal instructions, art of discussion.
2. Social Studies: Study occupations related to the constrsction industry and importance of settling greivences.

Bibliography:

Neal, Harry,Edward, From Spinning Wheel To Spacecraft, Julian Mesner Inc., New York, 1964.

Coyne, Halsey, Shores, Merit Students Encyclopedia, Crowell-Collier Education Corporation, 1967, pp. 474-491.

CONSTRUCTION

Assignment: 31 Grade Level: K-2

Title: Enclosing Framed Superstructures

Definition: Enclosing superstructures consists of enclosing the extension of a building with wood, metal, glass, paper, plastics, and masonry to protect the building from the elements.

Objectives: As a result of the learning experiences the students should be able to identify three types of materials and differentiate between them when and tell where each should be used.

Activities:

1. Identify three types of materials and explain when and where each should be used.
2. Have students collect pictures of buildings where brick is used and have them make up a bulletin board with this material.
3. Lay up a low brick wall.

Teaching Procedure:

1. Display at least three bricks.
2. Explain the special qualities and uses of each brick.
3. Have children lift, and feel the bricks to learn of the different textures and weight of each.

Relationships:

1. Social Studies: Industrial development of the brick industry dating back centuries to primitive man to the present time.
2. English: Write reports on several aspects of the industry.

Tools and Materials:

Common red brick, adobe brick, fire brick, used brick, glass brick, wood siding, insulating board, glass and plastics.

Bibliography:

--------------, How-To-Do-It-Encyclopedia, Volume 11, Golden Press, Fawcett Publications, Inc., New York, 1961, pp. 2047-2051.

Olson, Delmar W., Industrial Arts for the General Shop, 3rd Edition, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1968, pp. 261-265.

32

CONSTRUCTION

Assignment: 32

Grade Level: K-2

Title: Surfacing Interiors

Definition: Surfacing interiors includes the application of ceilings, walls, and floors to make the building functional and serviceable.

Objectives: As a result of the learning experiences the students should be able to recognize various building materials and the reason for using them on interior surfaces of buildings.

Activities:

1. Weave a simple mat.
2. Cement popscile sticks on cardboard to illustrate laying of hardwood floor.
3. Paste small squares of colored paper on cardboard to demonstrate how tiles should be laid.

Teaching Procedure:

1. Place twelve pieces of pre-cut palm leaves, flax, or any other broad leaf plant in a straight line on a desk.
2. Take an additional leaf and start inter weaving mat by alternating going over and under the twelve pre-cut leaves on the desk.
3. Where you have gone over the leaf in the previous step you now alternate and go under it.
4. Continue the procedure until mat is completed.
5. To prevent mat (flooring) from coming apart fasten edges by stapling.

Relationships:

Social Studies: This unit on "Laying Floors" can be incorporated within the social studies section, "People of the World." Would tie in very nicely with a study of the Phillipine Islands. By using different flooring materials this unit could be utilized by a discussion of the people of any nation.

Tools and Materials:

Paper cutter or scissors, leaves, stapler.

Assignment: 33

Grade Level: K-2

Title: Finishing the Project

Definition: Finishing the project includes major processes of painting, decorating, installing trim, cabinets, and hardware both functional and decorative, on bridges, highways, towers, homes, directional signs, harbors, tunnels, and subways.

Objectives: As a result of the learning experiences the students should be able to identify and compare various types of drawer pulls, and hardware as per hinges, door plates, kick plates, handles, etc.; and identify and compare various types of finishes.

Activities:

1. Identify and compare various types of drawer pulls, and door handles, types and where they will be found.
2. Identify and compare built-ins in the classroom.
3. Have the students differentiate what is decorative in the classroom and what is not.
4. Identify and construct various types of highway and street signs.

Teaching Procedure:

1. Have three drawer pulls to show the class, round, square, and oblong, explain each shape to the children.
2. Have them in three different finishes, explain each finish.
3. Have children locate door handles throughout the classroom and the school, explain shape and function.

Relationships:

1. Mathematics: Have children explain how many screws would be required to attach all three pulls.
2. Social Studies: Relate to industrial metal casting, polishing and plating.
3. Art: Forms and shapes.

Tools and Materials:

Three drawer pulls, one round polished brass, one square bronze, one oblong black iron.

Bibliography:

Feirer, John L., Woodworking for Industry, Chas. A. Bennett Co., Inc., Peoria, Illinois, 1963, pp. 383-384.

Vernon, Ralph J., Modern Woodwork, The Steck Co., Publishers, Austin, Texas, 1954, pp. 121-124.

CONSTRUCTION

Assignment: 34

Grade Level: K-2

Title: Painting and Decorating

Definition: Painting and decorating consists of applying finishes to a surface for the purpose of preserving or enhancing it.

Objectives: As a result of the learning experiences the students should be able to explain how stains penetrate into wood and observe the color change; identify two types of finishing materials.

Activities:

Have children take three blocks and dip one into water, one into water stain, and one into oil stain.

Teaching Procedure:

1. Have children examine and sand three small squares of soft wood.
2. Discuss with students what will happen to blocks after dipping in the three liquids.
3. Dip blocks in the three liquids and observe the color change.

Relationships:

1. Science: Relationships of elements on materials.
2. Health Education: The effects liquids have on the skin.

Tools and Materials:

Wood blocks, water stain, oil stain, water, sandpaper, rags, paint thinner, newspapers.

Bibliography:

--------------, Mechanix Illustrated, How-To-Do-It Encyclopedia; 1961, Colden Press, New York.

Feirer, John L., Woodworking for Industry, Chas. A. Bennett Co., Inc., Peoria, Illinois, pp. 599-610.

CONSTRUCTION

Assignment: 35

Grade Level: K-2

Title: Landscaping

Definition: Landscaping is the final operation to so arrange the effects of natural scenery over a given tract as to produce the best aesthetic effect, considering the use to which the tract is to be put.

Objectives: As a result of the learning experiences the students should be able to draw their home and care for plants.

Activities:

1. Plant seeds or bulbs.
2. Draw their home.

Teaching Procedure:

1. Have students sketch their homes.
2. Discuss their homes, pointing out importance of landscaping.
3. Have each student describe their home.
4. Show pictures other students have drawn.
5. Have students draw pictures of their homes with the idea anyone could find their home from the picture.

Relationships:

1. Art: Design and layout.
2. Language Arts: Talking before a group.

Tools and Materials:

Paper, water colors, crayons, scissors, paste.

Bibliography:

Mechanix Illustrated, How-To-Do-It Encyclopedia, Vol. 8, 1961, Golden Press, New York, pp. 1438-1441.

Assignment: 36 Grade Level: K-2

Title: Maintaining Property

Definition: Maintaining property is the systematic period inspection and maintenance of a building, road, house and grounds.

Objectives: As a result of the learning experiences the students should be able to understand the importance of keeping property in good repair; understand why it is important to take care of school property and also their own.

Activities:

1. Have custodian come to the room and explain how the school is maintained.
2. Take a tour of the school to note maintenance projects.

Teaching Procedure:

1. Teacher and students explain importance of upkeep of school building.
2. Have custodian explain some of the work and how it is done.
3. Have custodian take class on tour of school building and grounds.
4. Have students draw and explain pictures to class of tour.

Relationships:

1. Art: Drawing pictures.
2. Language Arts: Talking before a class.
3. Science: Names of shrubs and trees on the school grounds.

Tools and Materials:

Crayons, paper, paste, pencil.

Bibliography:

Feirer, John L., Woodworking For Industry, Chas. A. Bennett Co., Inc., Peoria, Illinois.

MANUFACTURING

MANUFACTURING

Assignment: 1 Grade Level: K-2

Title: Man and Technology

Definition: Technology is man's knowledge of efficient and systematic application of producing and consuming materials to satisfy his needs and demands.

Objectives: As a result of the learning experiences the students should be able to orally compare a primitive form of producing woven cloth to the modern technology of woven cloth production, in relation to time and quantity. Orally list several similarities and differences in the two weaving processing methods.

Activities:

1. Weave a simple place mat.
2. See related filmstrips and movies.
3. Make a class chart of the two processes of weaving cloth.

Teaching Procedure:

1. During an on-going unit of study about Indians, show a filmstrip entitled: Indian Clothing.
2. Give each child a piece of 12" x 18" pre-slit construction paper, along with at least eight ½" strips of contrasting colored construction paper.
3. Demonstrate how to weave the strips in and out of the slits, making sure each strip is pushed up as far as possible to prevent gaping holes. Paste the ends of the strips to the sides of the pre-slit paper.
4. Discuss the length of time the project took, and the difficulties encountered.
5. Show a movie or filmstrip on a modern textile industry. Compare the processes of the old and new ways, and discuss the time allotment and quantities in each.

Relationships:

1. Social Studies: Study of a primitive way of life; study of modern way of life.
2. History: Our American heritage as it relates to the American Indian.
3. Mathematics: Counting strips; recognition of numberal.
4. Art: Making an object pleasing to the eye (aesthetic beauty).

Tools and Materials:

12" x 18" pieces of construction paper, 8-10--½" strips of construction paper, paste. Movies: 1. 769 Facts About Fabrics. Filmstrips: 1. F-201 Indian Clothing, Curriculum Film Company; 2. F-25 Cotton, Encyclopedia Britannica Films; 3. F-1158 How American is Clothed, Eyegate; 4. F-1159 Clothing and Textiles, Eyegate.

Bibliography:

Galbraith, John Kenneth, The New Industrial State, Houghton Mifflin Company, 1967, p. 12.

MANUFACTURING

Assignment: 2 Grade Level: K-2

Title: The Beginning of Manufacturing;the Industrial Revolution

Definition: Manufacturing is an organized approach to making a product that man wants or needs. Manufacturing began in the home and through specialization, increased efficiency, and demand for increased volume, resulted in the growth of industry into the factory system. "The industrial revolution resulted in the adoption of power driven machinery in almost every phase of productive activity."

Objectives: As a result of the learning experiences the students should be able to observe the effects of steam power; list ways in which steam power is used in the technological world; and show in a simplified way, how a steam engine works.

Activities:

1. Put a pinwheel next to the spout of a steaming tea kettle to observe the spinning motion, caused by the expulsion of steam.

Teaching Procedure:

1. Bulletin board display of steam shovel, steam locomotive, steam boat, etc.
2. Read: Mike Mulligan and His Steam Shovel.
3. Direct children through the processes of making a simple pinwheel, giving each child a 4"x4" piece of construction paper.
   a. cut
   b. Fold same corner of each triangle toward the middle and hold together.
   c. Attach the parts together with a straight pin.
   d. Stick the pin and pinwheel in the eraser of a pencil.
4. Hold pinwheel close to the spout of a steaming tea kettle.
5. Relate steam power to locomotives, pile drivers, steamboats, etc.. Add that steam power made manufacturing possible.

Relationships:

1. Mathematics: Geometric shapes.
2. Science: Expansion of water and generation of steam

Tools and Materials:

Hot plate, tea kettle, water, 4"x4" squares construction paper, scissors, straight pins, pencils with attached erasers, bulletin board pictures pertaining to steam power, and book: Mike Mulligan and His Steam Shovel.

Bibliography:

Moore, Harry D., and Kibbey, Donald R., Manufacturing Materials and Processes, Richard D. Irwin, Inc., Homewood, Illinois, 1965, p. 2.

Rosen, McKee and Laura, Technology and Society: The Influence of Machines in the United States, Macmillan Company, New York, 1941, p. 34.

MANUFACTURING

Assignment: 3 Grade Level: K-2

Title: Manufacturing and the Economic System

Definition: Manufacturing is the process which our economic system uses to efficiently maintain a high level of productivity. Manufacturing technology is the process of supplying mankind's wants and needs by means of tools and machinery.

Objectives: As a result of the learning experiences the students should be able to mass produce a simple product; compare and identify verbally a product made by individual effort and one made by mass production; state verbally one reason how tools have made production easier than handcraft.

Activities:

- Each child individually mold a clay turtle; then the class form wax turtles by mass production.

Teaching Procedure:

1. Give each child a 2" ball of plasticene. Instruct the class to mold clay turtles. Teacher times the process for each child, and records it. Teacher calculates the average time.
2. For a group of six children, set up the equipment for a production line. Assign part, or let children choose each part of the turtle they wish to make.
3. The teacher clocks the children as they mold their assigned parts of the turtles, and assembles them. The production should last only as long as the calculated average time it took to make the one clay turtle.
4. Compare the number of clay turtles to the number of wax turtles made.

Relationships:

1. Art: Working with two different media.
2. Mathematics: Counting, comparison of number groups, minutes in time, numeral recognition.

Tools and Materials:

Per group of six: 1 tablespoon, 1 fork, 1 tea stirring spoon, rubber tubing for turtles legs. Wax recipe: 60% Beeswax or 1½ cups, 40% paraffin or 1 cup (if necessary, add enough of either ingredient for proper moldability or brittleness).

Bibliography:

Wankelman, Willard, Wigg, Philip, and Wigg, Mareitta, A Handbook of Arts and Crafts for Elementary and Junior High School Teachers, Wm. C. Brown Co., Dubuque, Iowa, p. 191.

Buffa, Elwood S., Modern Production Management, 2nd Ed., John Wiley and Sons, Inc., 1965, p. 3.

MANUFACTURING

Assignment: 4 Grade Level: K-2

Title: Manufacturing Management and Technology

Definition: Manufacturing management and Technology can be defined as the human activity that changes the material world to satisfy man's needs, through the processes of planning, organizing, and controlling the manufacturing processes.

Objectives: As a result of the learning experiences the students should be able to describe the planning, organizing, and controlling activities necessary to the process of making a pudding.

Activities:

1. Make pudding for the classroom simulated "First Thanksgiving Feast".

Teaching Procedure:

1. In group discussion the class should collectively discuss (1) the recipe for pudding, and (2) the necessary equipment. These items should be listed on chart paper.
2. Then the students should collectively organize the plan of action, and assign the tasks for each child. (Average class would yield four groups of seven or eight children in each).
3. Children divide into groups and prepare the instant pudding, and dish it into dixie cups.
4. While pudding is "setting", relate the activities they just experienced to processes of food industries: develop recipe, decide the necessary equipment, prepare the food, distribution, and consumer buying and eating it.

Relationships:

1. Social Studies: Culminating activity for Thanksgiving unit.
2. Mathematics: Measurements; sequence in counting; one-to-one correspondence.
3. Language Arts: Recipe, equipment, and names for tasks.

Tools and Materials:

Measuring cup, pudding: 3 oz. box for eight pupils, milk: 1 pt. for eight pupils, 4 tablespoons, 4 mixing bowls, plastics spoons: 1 per child, dixie cups: 1 per child.

Bibliography:

Scholastic Let's Find Out, "Teaching Guide", Vol. 2, No. 6, March, 1968.

MANUFACTURING

Assignment: 5 Grade Level: K-2

Title: Inputs to Manufacturing; Organization, Ownership, and Profit

Definition: Materials for manufacturing come from genetic reproduction, from extractive processes, and from industrial material production. Early industries were controlled by single families, but at the present time corporate enterprises operate under the ownership (private or public) and ultimate control of many individuals. The major motive for manufacturing is profit.

Objectives: As a result of the learning experiences the students should be able to construct and operate a classroom store with the given tools, materials, and time; describe the jobs of each person involved in the operation of the classroom store; simple define the term profit, and tell how it is utilized in store management.

Activities:

1. Construct and maintain a play grocery store.
2. Use production line to make wooden clogs.
3. Sell the clogs in the store.
4. Estimate the profit or loss.

Teaching Procedure:

1. Using cardboard boxes and wood for framing, construct a simple grocery store which includes a counter for checking out items.
2. Children make their own currency by cutting dowel rods with different diameters, and mark the values with felt pen.
3. Have children bring in empty food containers and categorize them according to proper food group and place on corresponding shelves.
4. Dramatic Play -- children take turns being manger, clerk, caryy-out boy, and shoppers.
5. Older children (second graders) may have two stores to demonstrate concepts of competitive buying and selling.

Relationships:

1. Social Studies: Community helpers and places.
2. Science: Study of the five basic food groups.
3. Mathematics: Currency value; sets; one to one correspondence; counting sequence; numeral recognition; quantity comparisons; terms e.g. more, less, equal.

Tools and Materials:

Assortment of boxes, wood for framing, hammers, nails, saws, assortment of empty food containers, toy cash register, dowel rods, felt pens, paper bags.

Bibliography:

Moore, Harry D., and Kibbey, Donald R., *Manufacturing and Materials and Processes*, Richard D. Irwin, Homewood, Illinois, 1965, p. 2.

MANUFACTURING

Assignment: 6 Grade Level: K-2

Title: Identifying Consumer Demand

Definition: The process of finding out what people will buy, would like to buy, or would not buy, through various kinds of surveys.

Objectives: As a result of the learning experiences the students should be able to readily identify the most popular and least popular product, as determined by a survey of three different products.

Activities: After sampling three different flavors of fondant candy, each child votes for his personal preference of flavor and color. The votes are tallied on the chalkboard for all to see.

Teaching Procedure:

1. Give each child a sample of peppermint, almond, and lemon flavored candy, each piece being either a red, yellow, or blue color.
2. Each child is to give his preference of flavor and color, and his answer is tallied under the corresponding heading on the chalkboard.
3. Upon completion of the class survey, note which flavor and color is best liked, second best, and least liked.
4. Make the fondant candy as a class project, flavoring and coloring it according to the results of the survey.

Relationships:

1. Mathematics: One to one correspondence; sequence in counting; measurements of 1/4 and 1 whole part; sets.
2. Language Arts: Experience chart; recipe; plan of action.

Tools and Materials:

1.. For survey:
Flavored, Colored fondant
candy pieces.

2. For each group of eight students:
1 mixing bowl
1 tablespoon
1 measuring cup
1 box confectioners sugar
milk
food coloring
flavoring
saran wrap
measuring spoons

3. Recipe:
1 box confectioners sugar
1/4 cup milk
1 tsp. flavoring
food coloring

Combine ingredients and stir. Mixture will be stiff. Divide candy into individual pieces and wrap in saran wrap.

Bibliography:

Ellis, Mary Jackson. Kindergarten Log, Vol. 1, Minneapolis: T. S. Denision Co., 1955, p. 57.

MANUFACTURING

Assignment: 7 Grade Level: K-2

Title: Research and Developing

Definition: Research is the careful investigation by scientists and technicians amied at the discovery of new materials, efficiency in production, and interpreting the findings or the development of new ideas and products.

Objectives: As a result of the learning experiences the students should be able to employ five different means to lift a heavy object; conclude that pulleys make lifting heavy objects easier for man; name at least two situations where pulleys are used to make work easier for man.

Activities:

1. Experiment with lifting heavy objects, using one type of simple machine.

Teaching Procedure:

1. Children should be allowed to experiment with the equipment during their free time, prior to a group presentation by the teacher.
2. In the group presentation, have several children try to lift a brick with one hand, then with both hands. Write their conclusions on chart paper.
3. Tie a string around the brick and use a spring balance to measure the work force. Write the results on the chart paper.
4. Attach the brick to a single pulley, and measure the work force with the spring balance. Chart the result.
5. Attach the brick to a double pulley, measure the spring balance, and chart the result.
6. Refer to the chart for comparing the work force of each activity, and draw from the children at least two conclusions concerning man and machines in relation to work.
7. List different ways in which pulleys are used.

Relationships:

1. Science: Principle of gravity; method of research; principle of work-force.
2. Mathematics: Numoral recognition; comparison of number sizes; measurement of weights.
3. Language Arts: Chart of work force; chart of different uses.

Tools and Materials:

Brick, heavy twine,spring, balance, single pulley, double pulley, and chart paper and pen.

Bibliography:

Columbus Public Schools' Fifth Grade Resource File, Science, "How is Our Work Made Easier?", Unit 3.

MANUFACTURING

Assignment: 8

Grade Level: K-2

Title: Designing Manufactured Goods

Definition: Design is the process by which manufacturers plan their products so that the products will be employable and attractive to the consumer.

Objectives: As a result of the learning experiences the students should be able to design a mode of transportation that is useful and attractive using shapes of various sizes and colors. Name and compare different modes of transportation. Discuss problems encountered in creating an acceptable design.

Activities:

1. Each child experiments with placing various sizes of colorful shapes, on a piece of construction paper, and creates a picture of one type of vehicle used in transportation.
2. Using an assortment of tinker toys, milk cartons, small boxes (e.g. salt, oatmeal, or cracker boxes), each child is to create his own design of a vehicle used in transportation.

Teaching Procedure:

1. Instruct the children to bring in all kinds of small boxes and wheels and axles from broken toys.
2. As the boxes are brought in, have the children paint them with tempera paint. (Wax coated boxes, such as milk cartons, require a small amount of mild, liquid soap added to the paint for better adhesion).
3. Divide the class into groups. Give each group an assortment of the boxes, wheels and axles, tinker toys, a stapler, paper punch, glue, string, and scossors.
4. Using the various media, instruct the children to create one design of transportation that is different from any other child's in his group.
5. After they have completed their designs, have the children show their creations and discuss the problems which they encountered in getting a design which was both workable and attractive. Relate their problems to those that industrial designers encounter when they are designing a car, truck, airplane, etc. (The model the child made would suffice for concreteness in visualizing general concepts of industrial design).

Relationships:

1. Social Studies: A good culminating activity for the unit of study on Transportation.
2. Physical Coordination: Eye-hand; motor control; and dexterity.
3. Art: Requirement of making something pleasing to the eye.
4. Science: Wheels move heavy objects without much human effort.

Tools and Materials:

All sizes of milk cartons, small food boxes, tempra paint, brushes, liquid soap, tinker toys, paper punch, stapler, various sizes of toy wheels and axles, scissors, yarn or string, paste: glue.

Bibliography:

Scholastic, Let's Find Out, Vol. 1, No. 6, March, 1967.

MANUFACTURING

Assignment: 9 Grade Level: K-2

Title: Creating Alternate Design Solutions and Making 3-Dimensional Models

Definition: Once the designing is completed, "ordinarily there are alternatives of designs, all of which meet functional requirements".

Objectives: As a result of the learning experiences the students should be able to design three alternate designs from a given model, which would meet the same requirements. Form a concrete object by refering to a drawing. Upon refining each design, the student should be able to determine his best one.

Activities:

1. Design and mold a Christmas tree ornament to decorate the classroom tree.

Teaching Procedure:

1. Give each child three 4" X 4" squares of newsprint paper. The teacher draws a simple Christmas ornament on the chalkboard. Instruct the children to draw three other designs of ornaments--one on each square.
2. After children finish their alternate designs, give each child three balls of clay--each 1½" in diameter. Instruct the children to mold each drawn ornament, improving upon each one.
3. Have each child select his best model to use as a guide. Give each child a ball of colored dough, 1½" in diameter, and instruct the class to form another ornament like their best models.
4. Allow dough ornaments 2 days to dry, turning occasionally, and punch a hold in each one for hanging purposes.
5. Shellac and decorate with glitter, sequins, old jewelry, etc..
6. Relate childrens' activities to those of the designers in industry. They illustrate their ideas, making several different ones, select one, make a model, and finally, produce it.

Relationships:

1. Social Studies: Preparation for a holiday.
2. Art: Appreciation for design and aesthetic beauty in product.
3. Hand skills: Developing finer hand muscles, motor control, and eye-hand coordination.

Tools and Materials:

4" x 4" squares newsprint paper, crayons, glue, glitter, old jewelry parts, beads, stones, etc., DOUGH-3 cups of flour, 1 cup of salt, 1/4 cup of water or enough to make mixture like pie dough, food coloring.

Bibliography:

Buffa, Elwood S., Modern Production Management, 2nd ed., John Wiley and Sons, Inc., New York, 1965, p. 137.

Scholastic Let's Find Out, "Teacher's Guide", Vol. 1, No. 3, December, 1966.

MANUFACTURING

Assignment: 10 Grade Level: K-2

Title: Refining the Design Solution

Definition: Refining a design is improving the original design as conceived by the designer.

Objectives: As a result of the learning experiences the students should be able to redeisgn the following traffic signs: curve, stop, railroad crossing.

Activities:

1. Improve on the design and construct traffic signs.
2. Model a clay object and improve on its design.
3. Propose a sample first aid kit and then redesign it.

Teaching Procedure:

1. Demonstrate six traffic signs.
2. Have pupils to make three traffic signs.
3. Name the colors found on traffic lights and signs.
4. Have pupils arrange colors properly on a sample or model traffic light or signs.
5. Have pupils compare their drawings with a actual traffic light, or signs.

Relationships:

1. **Art:** Pupils will have an opportunity of recognizing colors.
2. **Mathematics:** Pupils will be given the opportunity of counting the different colors they see on a traffic light.

Tools and Materials:

Pencils, graph paper, crayons.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., *Industrial Arts for Grades K-6*, The Bruce Publishing Company, Milwaukee, Wis., 1959, pp. 89-94.

MANUFACTURING

Assignment: 11 Grade Level: K-2

Title: Engineering the Product

Definition: Engineering a product is discovering solutions to a problem through analysis, deciding upon the solution to be used in making the finished product.

Objectives: As a result of the learning experiences the students should be able to discover a solution to a problem through analysis; develop habits of safety when crossing streets, roads, and avenues.

Activities:

1. Make survey of playground.
2. Draw and set up streets on a playground.
3. Policeman and fireman will give safety talks.

Teaching Procedure:

Consider the following points.

1. Where the streets are to be located.
2. How wide the streets are to be.
3. How long the streets are to be.
4. One street crosses another one.
5. Safety in crossing the streets
6. Appoint a traffic officer.
7. Have pupils use streets with bicycle, wagons, cars, and scooters.

Relationships:

1. Social Studies: Learning the duties of community helpers.
2. Safety: Learning to observe the rules of safety.
3. Mathematics: Developing the concept of length and width.

Tools and Materials:

Yardstick, rule, chalk, wagons, cars, bicycles, and scooters.

Bibliography:

Willis, Benjamin C., Teaching Guide for Industrial Education, Board of Education of the City of Chicago, Chicago, Illinois, p. 7.

Platts, Mary E. and Platts, Gordon H., Create A Handbook for Teachers of Elementary Art, Educational Service, Inc., Benton Harbor, Michigan, pp. 20-30.

Assignment: 12 Grade Level: K-2

Title: Designing Power Elements

Definition: Determining power requirement necessary for the job or project and designing the equipment necessary to meet those requirements.

Objectives: As a result of the learning experiences the students should be able to determine the power necessary for the job or project.

Activities:

1. Construct a pyramid out of large cardboard boxes.
2. Build with blocks.
3. Build models of houses and churches.

Teaching Procedure:

1. Teach the pupils how to stack objects.
2. Demonstrate the each layer has to be smaller than the one preceding it.
3. Introduce the concept of the inclined plane, to slide the blocks to the top layers.

Relationships:

1. Science: Simple machines used to help do work.
2. Mathematics: Developing the concept of counting and comparing different sizes of objects.

Tools and Materials:

Cardboard boxes, planks.

Bibliography:

Ragan, William B. and Stendler, Celia Burns, Modern Elementary Curriculum, Holt, Rinehart and Winston, Chicago, Illinois, p. 437.

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, The Bruce Publishing Co., Milwaukee, Wisconsin, pp. 89-91.

MANUFACTURING

Assignment: 13 Grade Level: K-2

Title: Making Working Drawings

Definition: A working drawing is one which contains all the information necessary to make a part, object or product.

Objectives: As a result of the learning experiences the students should be able to roughly sketch the outline of simple objects on drawing paper and identify the front, top and side views of simple objects.

Activities:

1. Students are to compare the different views of concrete objects with related views on work sheets.
2. Using scissors students are to cut out different boxes and paste them on to construction paper in their accepted order.

Teaching Procedure:

1. Discuss the different parts of an object in terms of front, top, and side views.
2. Using simple objects, draw their various views.
3. Using scissors, show how boxes can be cut.
4. Show students where to paste in different parts cut in step 3, above.

Relationships:

1. Health and physical education: Provides practice in hand-eye co-ordination and small and large muscle development.
2. Language arts: Helps in the communication of ideas.
3. Mathematics: Helps in teaching the concept of one to one relationships.
4. Art: Assists in teaching the concept of size and shape.

Tools and Materials:

18" X 24" construction paper, crayons, scissors, Spirit duplicator masters.

Bibliography:

Feirer, John L., Drawing and Planning for Industrial Arts. Chas. A. Bennett Co., Peoria, 1963, pp. 15-16.

MANUFACTURING

Assignment: 14

Grade Level: K-2

Title: Building the Production Prototype

Definition: A production prototype is a model that acts as a standard from which to make a reproduction - with or without change.

Objectives: As a result of the learning experiences the students should be able to make a full size model of simple objects; make simple molds; and make plaster castings.

Activities:

1. Making models using clay.
2. Making molds of models, using polyvinyl compound.
3. Making plaster castings.

Teaching Procedure:

1. Discuss what a prototype is and how it is used in industry.
2. Demonstrate how to make a simple object out of clay.
3. Demonstrate how to make molds using polyvinyl compound.
4. Demonstrate how to make plaster of paris castings.

Relationships:

1. Science: How different materials change from a liquid to a solid state.
2. Mathematics: Provide information concerning dry and liquid measure.
3. Social Studies: Show the importance of manufacturing to our economy.

Tools and Materials:

Clay, plaster of paris, polyvinyl compound, stirring rod, newspaper, receptacle, and water.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Co., Dubuque, Iowa, 1966, pp. 67-71.

MANUFACTURING

Assignment: 15 Grade Level: K-2

Title: Planning Production

Definition: Planning production is a detailed and systematic series of activities leading up to the output of a product.

Objectives: As a result of the learning experiences the students should be able to list the steps required to construct a copper tooled product; list two tools used in copper tooling; produce a simple object or publication.

Activities:

1. Using plastic forms, students are to plan and make a copper tooled wall placque.
2. Make a copper tooled object.
3. Plan, design, organize, and produce a publication of student's work.

Teaching Procedure:

1. Assist students in selecting plastic forms.
2. Demonstrate how to secure copper foil to the plastic mold with masking tape.
3. Using a round molding tool press metal into mold.

. Using the fine end of a tracing tool press out fine features.

5. Smooth out the background areas with the square end of a wood molding tool.
6. Remove the foil from the form and fasten it to a mounting board with glue.

Relationships:

1. *Science:* Children develop an understanding of some of the basic characteristics of copper.
2. *Art:* Assist in the discovery of new materials for self expression.
3. *Social Studies:* Shows the relationship between forms used in class and those used in industry.

Tools and Materials:

36 gauge copper foil, paste on picture holders, wood backing, molding tools, glue, masking tape.

Bibliography:

Feirer, John L., *General Metals*, McGraw-Hill Book Company, New York, 1952, pp. 179-181.

MANUFACTURING

Assignment: 16

Grade Level: K-2

Title: Planning Processes

Definition: Planning processes is a detailed schedule of manufacturing processes or steps in producing a product.

Objectives: As a result of the learning experiences the students should be able to relate to the teacher the processes in producing a Christmas tree ornament made from ¼" styrofoam plastic sheet stock.

Activities:

1. After one or more ornament designs have been selected, you are to list the various steps or processes necessary for the "mass" production of the Christmas tree ornament.
2. Other ideas might include: Occasion cards from potato prints, candles, soap making, paper weights, etc..

Teaching Procedure:

1. Discuss how Christmas ornaments were made in the past and elaborate on modern manufacturing.
2. After a design has been selected, each student should recognize each process in the manufacture of the Christmas tree ornament. Cookie cutters or a nichrome wire cutter may be used for the shaping of the ¼" plastic styrofoam.
3. Divide the class into process groups:
   a. unpacking and sorting the styrofoam sheet stock.
   b. cutting the styrofoam ornament shapes.
   c. placing holder, wires or punching holes in shapes.
   d. finishing the shapes-paint, color, glitter, sequins, etc..
   e. Quality control group.
   f. packaging for consumer.

Relationships:

1. Language and History: Christmas in other countries.
2. Mathematics: Dimensions and tolerances.

Tools and Materials:

Work station areas for each process group, styrofoam, wire, pliers, paint, glitter, and sequins.

Bibliography:

Christmas Styrofoam Projects, Ka-Pak Products, Chicago, Illinois, 1960.

Cherry, Ramond, General Plastics, McKnight and McKnight Publishing Company, Bloomington, Illinois, 1967.

Yates, Brock, Plastic Foam for Arts and Crafts, Sterling Publishing Company, Inc., New York, New York, 1966.

MANUFACTURING

Assignment: 17 Grade Level: K-2

Title: Technical Writing and Illustrating

Defintion: Technical writing and illustrating is the preparation of detailed, written description of a product with a photograph or technical sketch of the product.

Objectives: As a result of the learning experiences the students should be able to demonstrate his ability to describe in detail an engineered product and to be able to "illustrate" the product in use by the consumer on an 8½" x 11" piece of paper.

Activities:

1. You are to help the children compile a list of the important features, dimensions, innovations that the child feels are pertinent in describing a Christmas tree ornament. After the child has a verbal picture of the product, he is to draw an illustration of the manufactured product being used by the consumer.
2. Other ideas might include: occasion cards made with potato prints, cold candles, polyester plastic paper weights, etc..

Teaching Procedure:

1. Discuss the various shapes and designs of Christmas tree ornaments produced from styrofoam.
2. After a design has been chosen let the children describe in detail the decorations, functions, innovations, color, dimensions, or other verbalizations to describe the product.
3. Each child should produce an illustration of the product in use by the consumer on an 8½" X 11" piece of paper.

Relationships:

1. Language: Writing procedures and specifications.
2. Mathematics: Estimating.
3. Fine Arts and Drafting: Illustrating

Tools and Materials:

8½" x 11" paper and drawing materials.

Bibliography:

Christmas Styrofoam Projects, Ka-Pak Products, Chicago, Illinois, 1960.

Giesecke, Mitchell and Spencer, Technical Drawing, New York, New York, MacMillan Company, 1962.

MANUFACTURING

Assignment: 18

Grade Level: K-2

Title: Operating Quality Control System

Definition: Quality control is the inspection during and after production, to determine if the product meets specifications.

Objectives: As a result of the learning experiences the students should be able to produce a Christmas tree ornament from ¼" Styrofoam plastic and must be able to decorate its surface; to determine if the product meets specifications.

Activities:

1. Have students produce a functional Christmas tree ornament from ¼" Styrofoam with cookie cutters or nichrome wire cutters. After cutting and decorating the surface, inspect to insure that the product meets specifications.
2. Other activities might include: Quality control of candles, occasion cards, pin wheels, or other assembled products.

Teaching Procedure:

1. Discuss problems in the production of the Christmas tree ornament.
2. Discuss what constitutes a good quality ornament.
3. On a production line basis, produce a Christmas tree ornament.
4. Select several children to make certain that the ornaments being produced meet specifications. Remanufacture those that do not meet standards.

Relationships:

1. Chemistry: The study of plastics.
2. Social Studies: The histroy and production of Christmas ornaments.
3. Mathematics: Measurements of standards and specifications.

Tools and Materials:

½" styrofoam sheet stock, cookie cutters, or nichrome cutter, finishing materials: glue, paint, glitter, sequins, etc., wire or string for the hanger.

Bibliography:

Christmas Styrofoam Projects, Kap-Pak Products, Chicago, Illinois, 1960.

Yates, Brock, Plastic Foam for Arts and Crafts, Sterling Publishing Co., Inc., New York, New York, 1966.

MANUFACTURING

Assignment: 19 Grade Level: K-2

Title: Designing and Engineering the Plant. Supplying Equipment and Materials

Definition: Designing the plant consists in developing an idea of general factory layout. Plant engineering is planning the production line to make it efficiently.

Objectives: As a result of the learning experiences the students should be able to design pupil desk space in the classroom by marking X for each place; draw a stick chair for each space in the reading corner; design and engineer the production of stencil animals; and to design and engineer paper-plate masks.

Activities:

1. To design and engineer wooden animals for a circus display.
2. To design and engineer Halloween masks.
3. To design a floor direction map for Kindergarten.
4. To design clothes pin dolls.

Teaching Procedure:

1. Study large colored pictures of circus animals.
2. Have pupils select one animal to sketch on paper for wooden block tracing.
3. On another paper draw a rectangle and decide where each animal should stand on the display table and what he should be doing.

Relationships:

1. Science and Social Studies: Study of animals or man and his plysical limits.
2. Reading: Animal stories or stories about plants and their design.
3. Language Arts: Tell about trips to the circus or trips to a building that has been designed with the limitations of the people who will use it.

Tools and Materials:

Large squared graph paper 8½" x 11", large primary pencil, pictures of animals.

Bibliography:

Wilson, William, Expanding Experiences in Elementary Schools, Indiana Dept. of Public Instruction, Indiana, 1960, pp. 8-12 and 126-128.

Hening, Viola, Fun With Scraps, Bruce Co., New York City, 1947, pp. 114-115.

MANUFACTURING

Assignment: 20 Grade Level: K-2

Title: Employment and Occupations; Hiring and Training, Manufacturing Personnel Technology

Definition: Manufacturing personnel technology is the practice of hiring suitable employees for a particular job in industry and training them to adopt more highly skilled techniques.

Objectives: As a result of the learning experiences the students should be able to successfully demonstrate three characteristics of a leader in a game; a foreman in a class workshop; complete an assigned job in the classroom and do more difficult jobs with the help of the teacher.

Activities:

1. Direct others how to assemble spool puppets.
2. Follow directions to paint and carve an Indian totem pole.
3. Make a ring-toss peg game and demonstrate others how it operates.

Teaching Procedure:

1. Construct a spool puppet, when the face is drawn on a paper bag and stuffed to form the head.
2. With heavy cord string three small spools for each arm and leg, two large spools form the main part and are connected by typing.
3. Tie knots between each spool section.
4. Glue on yarn hair, hands and shoes cut from cardboard and dress with crepe paper.

Relationships:

1. Language Arts: Plays and stories about occupations.
2. Mathematics: Counting spools, hourly wages for different jobs and pay; schedules, vertizments.
3. Art: Design face,clothes, and ads to attract workers to a job.

Tools and Materials:

Cord, large and small spools, paper bag, crepe paper, yarn, stuffing, glue, cardboard, scissors, and crayons.

Bibliography:

Hunt, W. Ben, Indian and Camp Handicraft, Bruce Publishing Co., Milwaukee, Wis., 1938, pp. 18-19.

-------------, Washington Convention, New Directions for Industrial Arts, Brown Publishing Co., New York City, 1964, pp. 107-108.

MANUFACTURING

Assignment: 21

Grade Level: K-2

Title: Harnessing Energy from Nature, Securing Reproducible Raw Materials, Extracting Raw Materials

Definition: In harnessing energy from nature, natural fuels are used to power machines. Reproducible raw materials are those genetically produced while extracted raw materials are drawn out of the earth.

Objectives: As a result of the learning experiences the students should be able to identify and compare two reproducbile and extracted raw materials; use human, wind or electricity in some application of power; state two methods of harnessing energy of natural power.

Activities:

1. Make a pair of stilts to show human power in walking.
2. Make a pinwheel to show wind power using a pulley and two string belts to drive another pulley.
3. Make a clothespin airplane with a rubber band.
4. To separate living and non-living raw materials.
5. Have students role play strip mining in a sand box with model toys.

Teaching Procedure:

1. Explain that raffia is from grass, the metal ring from ore, and buttons from bone or plastic.
2. Cut raffia in 8 yard strips.
3. Fold each yard in half and tie.
4. With a slipknot fasten double lengths to a metal ring in eight different points.
5. String buttons two inches down from ring first singly and the second row with adjoining loops.
6. Tie strings together at end. Hang with potted plant.

Relationships:

1. Science: Plant holder and structure of earth strata.
2. Mathematics: Counting and measuring.
3. Art: Design of basket or view of structure of earth strata.
4. Social Studies: Different kinds of raw materials, and their sources.

Tools and Materials:

Raffia, metal ring, buttons, potted plant.

Bibliography:

Hening, Viola, Fun With Scraps, Bruce Publishing Co., New York City, 1947, pp. 24-27.

Newkirk, Louis V., Integrated Handwork, Silver Burdett Co., New York City, 1940, pp. 22-23.

MANUFACTURING

Assignment: 22 Grade Level: K-2

Title: Manufacturing Production Technology

Definition: Manufacturing production technology consists in converting some raw material which may be genetic or extractive into a usable product.

Objectives: As a result of the learning experiences the students should be able to tell the difference between genetic material and manufactured product.

Activities:

1. Making candles: Cast wax process.
2. Making all occasion cards.
3. Pop corn.

Teaching Procedure:

1. Spread the inside of a milk carton with oil.
2. Fill the carton with cracked ice cubes.
3. Place a wick in the middle; pour parafin wax over the ice.
4. Place in a refrigerator until the wax sets.
5. Remove the carton, and remaining water.
6. Use melted crayons with parafin wax for color.

Relationships:

1. Mathematics: Teaching the linear measure - applying the use of a tape measure or a ruler.
2. Science: Concept that oil and water do not mix.

Tools and Materials:

Parafin wax, ice cubes, milk cartons, wax crayons.

Bibliography:

------------ , Easy Handicrafts; Kap-Pak Products, Chicago, 1962.

MANUFACTURING

Assignment: 23 Grade Level: K-2

Title: Preparing Raw Materials

Definition: The preparation of material from its natural condition to a state where it can be used in the manufacture of goods.

Objectives: As a result of the learning experiences the students should be able to understand that raw materials are the basic elements in a finished product; prepare materials for a bulletin board display.

Activities:

1. Field trip: Walk to the woods or to a park.
2. Collect various kinds of leaves.
3. Press the leaves.

Teaching Procedure:

1. Organize a field trip into the woods or a park.
2. Instruct the children to observe and look for different kinds of leaves.
3. Collect the leaves for a bulletin board display.
4. Press the leaves between books.

Relationships:

1. Science: Study of trees and leaves.
2. Mathematics: Study of shapes in leaves.
3. Language Arts: Reading of library books based on trees, wood, forest.

Tools and Materials:

Leaves, carboard press, books.

Bibliography:

Peter, John, McCall's, Make It Book, Golden Press, New York, 1953.

MANUFACTURING

Assignment: 24 Grade Level: K-2

Title: Establishing Accident Prevention Program

Definition: Establishing Accident Prevention Program is a conscious and organized program of certain safety devices and safety precautions.

Objectives: As a result of the learning experiences the students will be able to identify and name safe housekeeping practices.

Activities:

1. Simulate a home situation where the students will discuss safety practices.

Teaching Procedure:

1. Create a kitchen work area in the classroom.
2. Discuss the safety devices in the kitchen
   a. stool to climb
   b. three-prong, self grounding plugs
   c. portable extinguisher
3. List some hazards found at home, mainly in the kitchen area.
   a. fresh waxed floors
   b. hot ovens - boiling water
   c. cleanig chemicals.

Relationships:

1. Reading: Reading of safety signs.
2. Health and Science: Discuss the price of an accident in relation to schoolwork, recreation and everyday living.

Tools and Materials:

Wall plug, three-prong plug, fire extinguisher, oven cleaner, and stool.

Bibliography:

National Safety Council, Safety Education, 425 North Michigan Avenue, Chicago, Illinois.

MANUFACTURING

Grade Level: K-2

Assignment: 25

Title: Organized Labor and Collective Bargaining, Working, Advancing, and Retiring

Definition: Organized labor and collective bargaining is the study of the growth of labor as an important part of the American Industrial Society, including a study of the individual workers' needs; his working conditions, advancement opportunities and retirement.

Objectives: As a result of the learning experiences the students should be able to identify verbally the following terms; Organized labor, collective bargaining, working, advancing, and retiring in relation to their own environment.

Activities:

1. Have the class cut out pictures from magazines and newspapers showing workmen in various occupations.
2. Organize the class into a simulated labor organization and use "role playing" as a means of settling labor disputes in the collective bargaining process.

Teaching Procedure:

1. Discuss the history of organized labor in the United States and point out how the union is organized and the collective bargaining process resolves labor disputes.
2. Design and construct a simple flow chart to help the class in organizing their own labor or professional group.

Relationships:

1. Social Studies: Factory system.
2. English: Spelling and vocabulary terms.

Tools and Materials:

Pencils, glue, paper, and scissors.

Bibliography:

Platts, Mary E., Create, Educational Service, Inc., Benton Harbor, Michigan, 1966, pp. 115-144.

MANUFACTURING

Assignment: 26 Grade Level: K-2

Title: Making Components or Finished Products

Definition: Making components or finished products is the process or processes of designing, drawing, manufacturing, assembling, and inspecting parts or finished products.

Objectives: As a result of the learning experiences the students should be able to design a simple toy boat; make a toy boat using wood as a basic material; use and identify six common hand tools; and use paint as a finishing material.

Activities:

1. Students are to select, design, and make a simple toy boat out of wood or any other suitable material.
2. Have the class make models of various means of transportation and prepare a display.
3. Organize the class into a simulated assembly line and use "role playing" as a means to explain how a finished product was accomplished.

Teaching Procedure:

1. Work through a sample design on the chalkboard and emphasize the elements of good design.
2. Demonstrate the use and care of hand tools.
3. Demonstrate the use and care of finishing materials.

Relationships:

1. English: Spelling and vocabulary words.
2. Social Studies: Transportation unit.

Tools and Materials:

Hammers, saws, planes, files, drills, nails, glue, finishing materials, clamps, and abrasive paper.

Bibliography:

Platts, Mary E., Create, Educational Service, Inc., Benton Harbor, Michigan, 1966, pp. 123-138.

Smith, Lavon B., and Maddox, Marion E., Elements of American Industry, McKnight and McKnight Publishing Company, Bllomington, Illinois, 1966, pp. 78-115.

MANUFACTURING

Assignment: 27

Grade Level: K-2

Title: Material Removing Practices; Edge Cutting and Abrading

Definition: Material removing practices are the processes of shaping, smoothing, and reducing the thickness of materials by traditional methods. Plane, file, saw, and abrasive paper.

Objectives: As a result of the learning experiences the students should be able to identify four common shaping tools, design a simple wood toy car or wagon, using simple hand tools in shaping soft wood, and apply finishing materials.

Activities:

1. Have the students build a car, truck, or wagon using tinker toys. Discuss with the students how this would be done using common shaping tools.
2. Make drawings of animals on cardboard and cut out to their desired shape. Use paste, glue and pins to assemble. Explain how this is a very simple shaping operation.
3. Have the students cut out examples from old magazines on materials and how their appearance or shape might be changed.
4. Have the class identify different materials in the classroom.

Teaching Procedure:

1. Discuss common materials and how their shape might be changed by simple tools.
2. Demonstrate how finishing materials approve the appearance and the life of the product.
3. Demonstrate common shaping tools.

Relationships:

1. Social Studies: Study of transportation.
2. Geography: Materials and where they come from.

Tools and Materials:

Hammers, files, planes, abrasive paper and finishing materials.

Bibliography:

Platts, Mary E., *Create*, Educational Service, Inc., Benton Harbor, Michigan, 1966, pp. 121-150.

Gilbert, Harold G., *Children Study American Industry*, Wm. C. Brown Co., Dubuque, Iowa, 1966, pp. 1-150.

Assignment: 28 Grade Level: K-2

Title: Material Removing by Non-traditional Processes

Definition: Material removal is the separation of varying amounts of material from any substance. Non-traditional refers to such practices of cutting and abrading as laser beam, electronic arc, ultrasonics, etc..

Objectives: As a result of the learning experiences the students should be able to visit to observe a non-traditional stock removal and be able to identify it verbally; observe a local watchmaker use ultrasonic sound for dirt removal and tell what the watchmaker has done.

Activities:

1. Observe non-traditional stock removal by going on a field trip.
2. Visit a local jeweler to observe ultrasonic cleaning of metal parts and jewelry.
3. Observe a non-traditional method through the use of audio-visual aids.

Teaching Procedure:

1. Explain and discuss non-traditional methods of removing stock.
2. Explain basic concepts of ultra sonic sound to children.
3. The teacher should explain to the children that these methods are used in special situations, are new, and relatively costly.

Relationships:

1. Science: Light, sound, electromagnetic waves.
2. English: Oral presentations and discussions.

Bibliography:

---------------, "The Power and Potential of Pure Light, " *Time*, 42-29, July 12, 1968.

Assignment: 29

Grade Level: K-2

Title: Material Forming Practices

Definition: Material forming is the process by which a material is compacted, bent, cast, or otherwise made into a new shape.

Objectives: As a result of the learning experiences the students should be able to differentiate between cast and bent objects and drape a slab of clay over a mold.

Activities:

1. Drape a 6" round slab of clay over a small dish and allow to dry.
2. Bend wire into geometric shapes; square, triangle, circle.
3. Make jello and mold.

Teaching Procedure:

1. Demonstrate rolling a slab cutting circle and draping over a form. Point out sequential steps.
2. Show sample objects formed by casting and bending. Describe ways of differentiating each.
3. Relate the cast and bent items to various materials used in manufacturing consumer items - metals, ceramics, plastics, bent wood.

Relationships:

1. Social Studies: Mining extraction, ceramic industries.
2. Mathematics: Measuring and cutting circle.
3. Science: Change in state, evaporation.

Tools and Materials:

Ball of clay, rolling pin, sticks for rolling, drape mold, 6" round template.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Dubuque, Iowa, Wm. C. Brown Co., Chapter 3, 1966.

Smith, Lavon B. and Maddox, Marion E., Elements of American Industry, Bloomington, McKnight and McKnight Publishing Co., 1966.

MANUFACTURING

Assignment: 30 Grade Level: K-2

Title: Hot and Cold Working

Definition: Material working practices are performed under two processes. Hot working is the process by which heat is necessary in the shaping of material. Cold working refers to working materials which can be worked at room temperature.

Objectives: As a result of the learning experiences the students should be able to bend or otherwise shape a material at room temperature; bend or otherwise shape a material by the addition of heat.

Activities:

1. Twist and bend wire into a bangle bracelet.
2. Heat acrylic plastics and bend into small picture frame.
3. Heat old candles, then bend into geometric shapes.

Teaching Procedure:

1. Demonstrate to children some materials that are formable at room temperature while others require added heat.
2. Have each child use a hand drill to twist and bend a bracelet from soft metal wire.
3. Using candles, soften them with available heat, and demonstrate bending and shaping.
4. Discuss the difference between cold and hot bending.

Relationships:

1. Social Studies: Metal industry, Colonial period.
2. Science: Concepts of "hot" and "cold".

Tools and Materials:

Candles, copper or aluminum wire, hand drill, heat source, steel wool.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Dubuque, Iowa, Wm. C. Brown Co., 1966.

Smith, Lavon B. and Maddox, Marion E., Elements of American Industry, Bloomington, Illinois, McKnight and McKnight Company, 1966.

MANUFACTURING

Assignment: 31 Grade Level: K-2

Title: Casting

Definition: Casting is the reproduction of an original through the introduction of a viscoud material into a mold where it is solidified.

Objectives: As a result of the learning experiences the students should be able to pour a liquid material into a prepared mold; explain the phenomena of hardening, skrinkage, and expansion.

Activities:

1. Make jello and mold it.
2. Pour and mold a wax candle.
3. Mix and pour plaster into a plastic mold.
4. Pour a clay slip into a one piece plaster mold.

Teaching Producedure:

1. Discuss how the finished molded item conforms exactly to the shape of the mold. Show a number of different molded items.
2. Using a simple plastic mold suitable for a wall plaque, measure and mix suitable amount of plaster. Pour into mold. When dry, repeat. Discuss why both are identical.
3. Decorate with tempera paints.

Relationships:

1. Social Studies: Colonial times, casting pewter spoons and plates, candles.
2. Home Economics: Molding foods.
3. Science: Change of state of fluids.

Tools and Materials:

Plaster, plastic molds, mixing container, water, brushes, tempera paints.

Bibliography:

Smith, Lavon B. and Marion E. Maddox, Elements of American Industry, McKnight and McKnight Publishing Company, Bloomington, Illinois, 1966.

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Company, Dubuque, Iowa, 1966.

MANUFACTURING

Assignment: 32 Grade Level: K-2

Title: Combining Materials into Products

Definition: The process of combining materials into products is the bringing together of various substances to form a more complex item.

Objectives: As a result of the learning experiences the students should be able to measure, mix and otherwise combine materials according to a specific formula.

Activities:

1. Mix cement to make a small flower pot.
2. Combine flour, water, salt and shredded paper to make puppet heads.
3. Combine the ingredients to make bread dough.

Teaching Procedure:

1. Discuss with children items they have mixed together to form a useful product.
2. In large plastic bowl combine paper, salt, and flour mixture.
3. Have each child form a puppet head.
4. When dry, paint each head as required.

Relationships:

1. Science: Mixtures, compounds, for a new product.
2. Home Economics: Preparing recipe.
3. Mathematics: Use dry and wet measure.
4. Oral Language: Use puppets in drama, role playing, show and tell.

Tools and Materials:

Table salt, wallpaper paste, plastic bowl, pieces of paper, paint, brushes, mixing spoon, water, measuring cups.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Milwaukee, Bruce Publishing Co., 1959.

Gilbert, Harold G., Children Study American Industry, Dubuque, Iowa, Wm. C. Brown Company, 1966.

MANUFACTURING

Assignment: 33 Grade Level: K-2

Title: Coating Surfaces

Definition: Coating surfaces is the method of preserving, decorating, or adding properties the basic material does not posses. Some widely used coating processes are painting, enameling, plating and laminating.

Objectives: As a result of the learning experiences the students should be able to paint a surface to protect itand to beautify it; properly brush on acrilic paints.

Activities:

1. Paint a coffee can to use as a class crayon box.
2. Paint pieces of classroom equipment.
3. Dip or brush on ceramic glaze on a clay piece.

Teaching Procedure:

1. Discuss how coating surfaces improves wearability and performs special jobs ie., water proofing, insulating and beautifying.
2. Using brushes and various colors of paint, have each child paint and decorate coffee cans for use as crayon cans.
3. Discuss how many items they know about that have been finished at the factory, and what types of finishing they have seen on items in their homes.

Relationships:

1. Social Studies: Pioneers' use of wax for waterproofing and furniture finishing. Community helpers.
2. Science: Rus proffing, insulating, waterproofing.

Tools and Materials:

Acrylic paints, 1" nylon brushes, coffee cans, mixing sticks.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Dubuque, Iowa, Wm. C. Brown Co., 1966.

Smith, Lavon B. and Maddox, Marion E., Elements of American Industry, Bloomington, Illinois, McKnight and McKnight Publishing Co., 1966.

MANUFACTURING

Assignment: 34 Grade Level: K-2

Title: Assembling Components into Sub-Assemblies and Finished Products

Definition: Assembling components into sub-assemblies and finished products is a process where two or more pieces are brought together or assembled using various technologies of joining.

Objectives: As a result of the learning experiences the students will be able to assemble all pieces necessary to make a finished product; assemble pieces using more than one joining method.

Activities:

1. Make a small wooden memo holder using clothespin.
2. Make a cloth hand puppet.
3. Make a wooden boat, car or plane.
4. Make a small electric switch.

Teaching Procedure:

1. Draw pattern of hand puppet on suitable cloth and cut out.
2. Fasten halves. Children work in three groups, each using a different assembly methods, one to sew, one to staple, and one to glue.
3. Paint on faces with magic markers.
4. Compare methods of assembly for difficulty, time, strength, appearance. Discuss the above items.
5. Relate assembly to other products and demonstrate other methods of assembly.

Relationships:

1. Social Studies: American Industry, Industrial Revolution.
2. Language Arts: Use puppets for creative drama.
3. Home Arts: Sewing, creative stitchery.
4. Mathematics: Concept of halves.

Tools and Materials:

Cloth, scissors, staple machine, white glue, needles, thread and magic markers.

Bibliography:

Gerbracht, Carl and Robinson, Frank E., Understanding America's Industries, Bloomington, McKnight and McKnight.Publishing Co., 1962.

Gilbert, Harold G., Children Study American Industry, Dubuque, Iowa, Wm. C. Brown Co., 1966.

Smith, Lavon B. and Maddox, Marion E., Elements of American Industry, Bloomington, McKnight and McKnight Publishing Co., 1966.

MANUFACTURING

Assignment: 35 Grade Level: K-2

Title: Preparing for Distribution

Definition: Preparation for distribution includes those processes that clearly mark, label or identify, count, bag, wrap, or otherwise package a product for shipment.

Objectives: As a result of the learning experiences the students should be able to mark, count and bag a manufactured item and make it ready for distribution and sales.

Activities:

1. Hand print wrapping paper and wrap a gift.
2. Count and distribute milk for snack time.
3. Print a bag - mark with the item's color and insert item, and then staple closed.
4. Build a store and sell products.

Teaching Procedure:

1. Take a walking trip to a local supermarket and demonstrate to the children how different items are packaged and marked for consumer use.
2. Design and print a package for item.
3. Mark bags to identify item and staple the bag closed.
4. A movie or trip to a plant showing how a packaging procedure will relate the industrial process to the classroom activity.

Relationships:

1. Social Studies: Class store, distribution of materials, transportation industry.
2. Economics: Problems of returns because of breakage, consumer identification.
3. Mathematics: Shapes, counting.

Tools and Materials:

Crayons, or magic markers, small paper bags, staple machine, gum erasers for printing, stamp pad or tempera paint.

Bibliography:

Gerbracht, Carl and Robinson, Frank E., Understanding America's Industries. Bloomington, McKnight and McKnight Publishing Company, 1962.

Packaging Magazine

Assignment: 36

Grade Level: K-2

Title: Servicing Manufactured Products

Definition: Servicing consists of installing, maintaining, repairing or altering a manufactured product after it leaves the point of manufacture.

Objectives: As a result of the learning experiences the students should be able to perform a simple service operation.

Activities:

1. Oil the axles of a trike or wagon.
2. Replace dry cell batteries in a toy or flashlight.
3. Clean a file with a file card.

Teaching Procedure:

1. Discuss and explain the importance of correct servicing and who performs the work.
2. Demonstrate how to use an oil can, including proper quantity of oil needed.
3. Show how, when oiled, wheel is quieter and turns easier.
4. Have children identify those items that they or their parents have had serviced and who did servicing.

Relationships:

1. Social Studies: Relate to community helpers.
2. Economics: Product reliability and length of service.
3. Science: Reduction of friction and rust prevention.

Tools and Materials:

Oil, oil can, trike or wagon, rags.

Bibliography:

Bendick, Jeanne and Berk, Barbara, The First Book of How to Fix It. New York, Franklin Watts, Inc., 1961.

Gilbert, Harold G., Children Study American Industry. Dubuque, Iowa, Wm. C. Brown Co., 1966.

Stack, Herbert J., and Elkow, J. Duke, Education for Safe Living. Englewood Cliffs, New Jersey, Prentice Hall, Inc., 1959.

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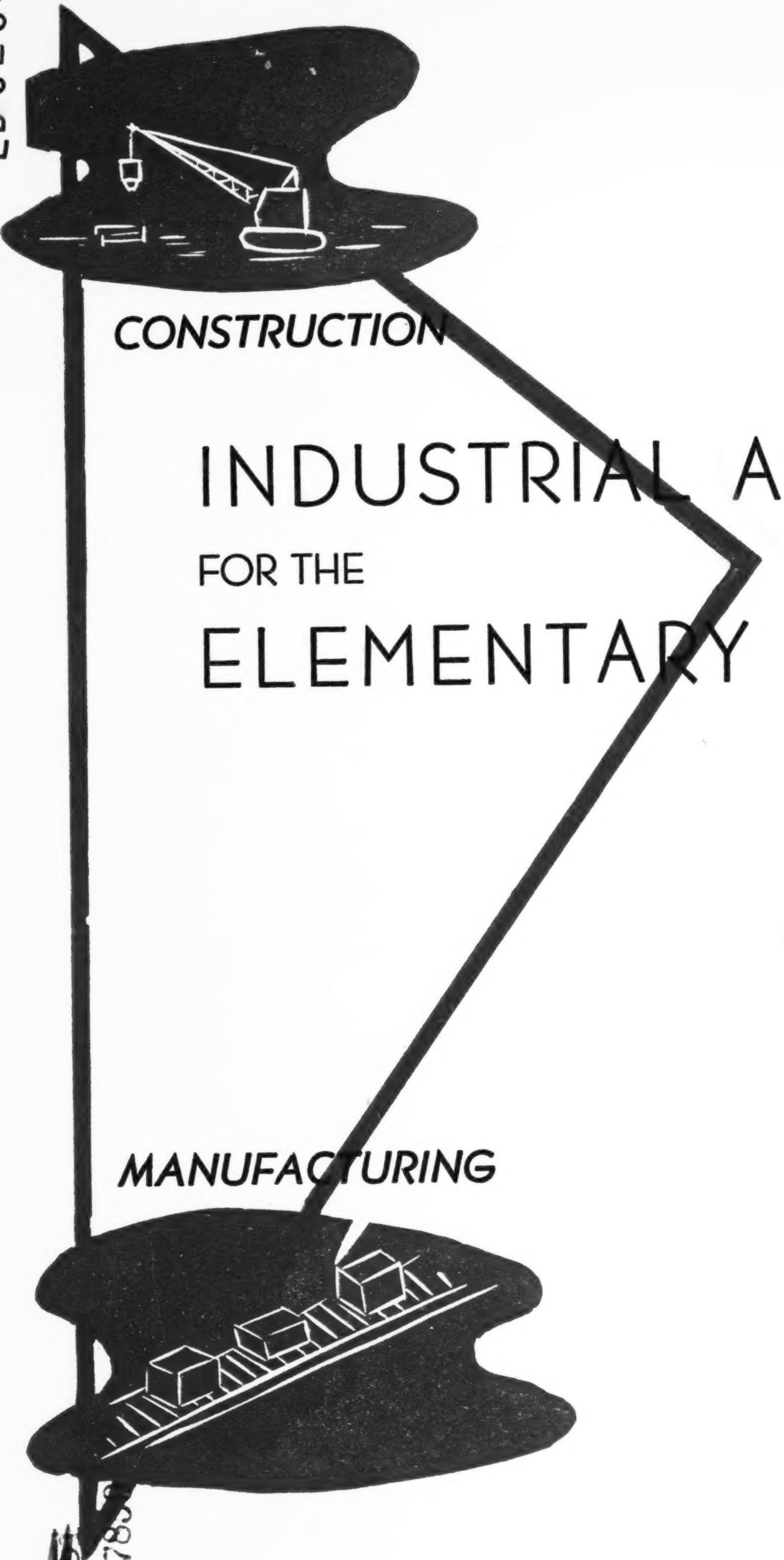
CONSTRUCTION
MANUFACTURING

INDUSTRIAL ARTS
FOR THE
ELEMENTARY SCHOOL

3-4

NDEA Institute for
Advanced Study
The Ohio State University
1968

VT00783

Guides

in

CONSTRUCTION AND MANUFACTURING

for

Elementary School Industrial Arts

Summer 1968

NDEA Institute for Advanced Study
in Elementary Industrial Arts

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The Ohio State University
Columbus, Ohio
43210

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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INTRODUCTION

This institute was specifically designed to strengthen the participants' qualifications as classroom teachers, supervisors, and teacher educators with special reference to the areas of industry and technology at the elementary school level. The program of study and the practicum experiences were designed to strengthen the participants' philosophical orientation; provide an awareness of new approaches techniques, and skills; and demonstrate effective means of developing curriculum materials for elementary school pupils.

The overriding objective of the institute was to effect curriculum change in the industrial arts offerings of the elementary school. The specific objectives were: 1) to help participants increase their knowledge of industry and technology, with special emphasis on those local industries that influence childrens' everyday living; 2) to assist participants in projecting a rationale for the inclusion of industrial arts in the elementary curriculum; 3) to help participants increase their skills in writing curriculum materials and developing laboratory experience for pupils at the elementary school level; 4) to provide practicum experience through teaching selected units to pupils in an elementary school setting; and 5) to help participants gain knowledge of the rich instructional resources available from industry in the community.

One unique feature of the institute was the inclusion of classroom elementary teachers, industrial arts teachers, industrial arts supervisors, and industrial arts teacher educators. They worked together as colleagues in the institute and profited from the interaction that occured because of their difference in perspective. A second unique feature was the practicum experience with a demonstration class of elementary school pupils. Realistic classroom situations helped to ensure valid methodology and content selection.

Leaders in the profession through the AIAA, the affiliated ACESIA, and other professional organizations have long recognized the need to develop meaningful programs for elementary schools that reflect the contemporary industrial and technological society in which young children live. This institute helped to further the renewed interest that has been shown in elementary industrial arts. Extended effort is required if industrial arts activities are to find their appropriate place in a well-balanced elementary school program.

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PREFACE

These guides for the elementary grades K-6 were developed by the twenty-five participants under the guidance of a staff of specialists in industrial arts. Each of the booklets was developed and organized by grade levels K-2; 3-4; 5-6 and encompassed material listed under the headings of construction and manufacturing. Each participant was responsible for the development of a share of the lessons, when totaled amounted to seventy-two in all. Each participant as nearly as possible developed guides in his major area of interest and on the grade level of his choice.

The general approach used by each group was common and was based on lectures by staff and visiting lecturers, group discussions and the experiences that were a result of working with the elementary students at the University School.

These guides are in no way intended to limit the teacher's class activities but rather to serve as a direction or approach to aid in the development of other guides to meet the needs of the classroom situation. It is hoped that these experiences will spark the imagination of the teachers so that they will attempt new and better ways of interpreting industry to the elementary school students. In the case of administrators it is hoped that they will provide their own staff the opportunity to implement a program in elementary school industrial arts and encourage the staff to do so. The teacher educators have increased their base on which to interpret the vast systems of construction and manufacturing to future teachers.

Victor W. Hoffman, Director
NDEA Institute for Advanced
Study in Elementary Industrial
Arts. Summer 1968

Other Instructional Materials

In This Series

K-2
5-6

CONSTRUCTION

CONSTRUCTION

Assignment: 1 Grade Level: 3-4

Title: Man and Technology

Definition: Technology is the knowledge of man's efficient practices, and is the means by which he efficiently produces the goods to meet his needs.

Objectives: As a result of the learning experiences the student should be able to recognize two of man's achievements in technology through a study of his materials and practices.

Activities:

1. Study groups of noe more than five children to research through school library and classroom sources, achievements in technology.
2. a. The groups will identify and classify each achievement as to materials or practices.
   b. The groups will present their findings to the class and the class will help determine whether they have classified their achievements correctly.
2. The children may choose which source of technical achievement they wish to develop (ie. material, or practices) and illustrate the sequence of achievements by any creative means they choose (art, woodcarving, scrap book, and etc.) These activities may be displayed.

Teaching Procedure:

Various art medium will be worked and experimented with by the children such as water color, chalk and charcoal, clay, wood carving and construction, weaving and block printing; prior to beginning this activity. Then the children will be allowed freedom to decide which subject they choose and how they will illustrate the sequence.

Relationships:

1. Mathematics: The use of a ruler and measuring devices. Fractions through measuring quantities.
2. Spelling and Dictionary Work: The many new terms they will encounter through their research study.
3. English and Communication: The need to report their findings both oral and written as well as the basic procedure for researching material.
4. Reading: The need to read material in order to research this information.

Tools and Materials:

Source books of a wide variety. (Mainly the illustrated ones). Art materials of a wide variety; water color, poster paint, charcoal, colored chalk, colored pencils, scissors, many sizes of brushes, clay, wood blocks, wood pieces, carving tools, construction paper, art paper.

Bibliography:

Olson, Delmar W., Industrial Arts and Technology, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1963.

CONSTRUCTION

Assignment: 2 Grade Level: 3-4

Title: Construction Technology

Definition: Construction technology is the knowledge of how to use tools and techniques to build an object.

Objectives: As a result of the learning experiences the students should be able to learn the function and use of a set of basic tools as well as the techniques for constructing a simple bird house.

Activities:

1. Sketch a front, side and top view of the birdhouse they plan to make.
2. The children can outline a few steps telling which parts will be made first, how the item will be assembled and when it will be painted. (The teacher can help them anticipate any difficulties in cutting or assembly and plan to avoid them.)

Teaching Procedure:

1. The procedures for drawing simple dimensions will be reviewed.
2. The children will them be given the tools to draw their own individual plans.
3. After the plans are complete, a few sample drawings will be shown and discussed by the teacher and the class. The teacher should make every effort to let the children think and solve the problems themselves.

Relationships:

1. English and Communication: Application of their language arts in a practical situation.
2. Art: Design and sketch plans.
3. Mathematics: Measuring and dimension - figuring cost of materials.
4. Science: The study of birds, their feeding and nesting habits.

Tools and Materials:

Charts and illustrations showing the function and parts of the tools to be used, graph paper, straight edges, and pencils for each child, soft wood, saws, clamps, hammers and nails.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, The Bruce Publishing Company, Milwaukee, 1959.

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Company Publishers, Dubuque, Iowa, 1966.

Husbands, Kenneth L., Teaching Elementary School Subjects, The Ronald Press Company, New York, 1961.

Industrial Arts Curriculum Project, Industrial Technology I, The World of Construction, The Ohio State University, 1967-68.

CONSTRUCTION

Assignment: 3 Grade Level: 3-4

Title: Applying Technology to People

Definition: Technology has elevated man by allowing him to create his own environment, control natural forces, and achieve freedom from enslavement.

Objectives: As a result of the learning experiences the students should be able to note four items by which technology has elevated man and relate this to the field of construction by verbal examples or art illustrations.

Activities:

1. A visit to a museum featuring the progress of man through technology.
2. A serial on the improvement of structures for men to live in through the years.
3. A mural showing the different ways man has controlled natural forces.
4. After choosing a labor saving device they wish to study, the children will give a brief oral report, using whatever visual aids necessary to help illustrate their talk.

Teaching Procedure:

In the 3rd and 4th grades, the students will have very little skill in organizing an oral report. Thus, the first step will be to prepare and ready them in this area. Several approaches might be: During a reading group the teacher could stop after the finish of a particular interesting story and ask one of the members to retell the story to the group, explaining at the end, that this was an "oral report". The simplicity and ease with which a report can be made would be stressed at this time. Another approach could be to let a student retell the events from an educational T.V. program the class had just viewed or any of the many opportunities that arise to let the children report orally on something they have just learned or experiences.

Relationships:

1. Language Arts: Increased ability to organize and give an oral report.
2. Spelling: New terminology.
3. Reading: Practice in reading in preparation for a report.
4. Social Studies: History in relationship to technology and the student himself.

Tools and Materials:

Dowel and carton for making serial box, butcher paper, art supplies, resource books or pamphlets.

Bibliography:

Husbands, Kenneth L., Teaching Elementary School Subjects, The Ronald Press Co., New York, 1961.

------------------, Industrial Arts Curriculum Project, Industrial Technology I, The World of Construction, The Ohio State University, 1968-69.

CONSTRUCTION

Assignment: 4 Grade Level: 3-4

Title: Managing Technology

Definition: Managing technology is the systematic consideration and practical application of conepts and objectives to accomplish specific industrial goals that may be stated in terms of performance.

Objectives: As a result of the learning experiences the students should be able to conclude that man may conserve animals by feeding them.

Activities:

1. Give two examples of how man has displaced and interrupted nature. Methods of restoring natural balances should be noted.

Teaching Procedure:

1. The teacher will display and discuss pictures of birds in their natural environments. These would be located on a wall map.
2. Have pupils draw pictures of bird scenes from their own neighborhoods.
3. Compare and discuss the differences in natural and interrupted bird environments. Conclude that man may conserve animal life. Conclude further that a bird bath is a method of conservation.

Relationships:

1. Fine Arts: The bird pictures would be evaluated for craftsmanship, unity, etc.
2. History: Pioneers cleared the land and upset many natural balances.
3. Geography: Some birds live only in specific areas of our country.
4. Science: Birds need specific diets. Some eat meats. Others do not.

Tools and Materials:

Map of North America, colored chalk, manila paper, tissue paper, chalk dust spray.

Bibliography:

Bale, Robert O., Creative Nature Crafts, Burgess Publishing Company, Minneapolis, 1959, pp. 52-53.

CONSTRUCTION

Assignment: 5

Grade Level: 3-4

Title: Beginning the Project

Definition: Beginning the project is the initiation of any or all of the component legal and material units that will be combined to form the completed project.

Objectives: As a result of the learning experiences the students should be able to draw a pattern for a laced wire suet holder.

Activities:

1. Determine the size of the wire holder.
2. Make a simple jig for tracing a pattern.
3. Trace the wire pattern.

Teaching Procedure:

1. Give each pupil one wood block to be used for the back of the feeder.
2. Instruct the pupils to pound a nail near each corner of their wood blocks.
3. Invert the block on a sheet of paper and connect the four points where the nail heads touch the paper.

Relationships:

1. Language Arts: Ask several pupils to tell the story of what they did in order (sequence). Does everyone agree?
2. Mathematics: Teach the concepts of square and rectangle.

Tools and Materials:

Wood blocks, 3-penny nails, hammers, pencils, 8½" x 11" paper.

Bibliography:

Smith, Lavon Benson, Maddox, Marion E., Elements of American Industry, McKnight and McKnight Publishing Company, Bloomington, Illinois, 1966, Chapter 1.

CONSTRUCTION

Assignment: 6 Grade Level: 3-4

Title: Selecting a Site

Definition: Selecting a site is making a positive decision to use a definite geographic area for a specific purpose.

Objectives: As a result of the learning experiences the students should be able to decide which tree on the school grounds will hold the birdfeeder.

Activities:

1. Identify tree types.
2. Measure height of tenative locations.
3. Consider sun, shade factors.
4. Select a single location.

Teaching Procedure:

1. The teacher would lead pupils in drawing a diagram of the school's front lawn. All trees that could serve as locations for the birdfeeder would be included in this diagram.
2. Pupils would visit the lawn site. The critical demands, height, frontal direction, etc. would be discussed on the site.
3. Discuss the factors that are necessary in locating one tree for installing the feeder.

Relationships:

1. Science: Identifying types of trees.
2. Mathematics: Vertical measurement, scale drawing.
3. Language Arts: Group discussion technique.

Tools and Materials:

9" x 12" manila drawing paper, pencils, 12" rulers, 6' step ladder.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Company, Milwaukee, 1959.

CONSTRUCTION

Assignment: 7 Grade Level: 3-4

Title: Surveying and Mapping and Soil Testing

Definition: Surveying is to study land site to determine boundaries, elevations, depressions, and other factors that might affect the land usage.

Soil Testing is the performing of various tests on the soil of a land site that might indicate some affect on how the land is to be used.

Objectives: As a result of the learning experiences the students should be able to define the processes of preparing land for a structure (surveying and soil testing); make a simple topographic map; layout a simple structure site; perform a simple soil test.

Activities:

1. Examine local structures and sites.
2. Examine pictures and drawings of structures and land sites.
3. Discuss problems of area terrain, and soil.
4. Layout a site for a simple structure
5. Perform a soil test.

Teaching Procedure:

1. Take a field trip to see different types of structures and sites.
2. Display pictures and architectural drawings and discuss differences and problems.
3. Make a drawing of a simple bird house showing front, side and top views and all dimensions.
4. Have children build simple block structures on different types of terrain.
5. Set heavy block or brick in three different types of soil (sandy, hard, muddy) and discuss observations.

Relationships:

1. Social Studies: Pioneer and Indian houses.

Tools and Materials:

Pictures and drawings, drawing paper, building blocks or brick, different soils, children's building blocks.

Bibliography:

----------------, How-To-Do-It-Encyclopedia, Golden Press, New York, 1958, Volume 8, p. 190.

CONSTRUCTION

Assignment: 8 Grade Level: 3-4

Title: Designing the Construction Project

Definition: Designing is finding a solution to a problem through identifying the problem, developing preliminary ideas, analyzing possible solutions, and deciding upon a solution to be implemented.

Objectives: As a result of the learning experiences the students should be able to design a simple structure using available materials; define the steps of designing a structure.

Activities:

1. Design a structure that can be built in the classroom, keeping in mind materials, tools, and space available. The structure may be actual or model size.
2. Draw a three view drawing of the design.

Teaching Procedure:

1. Decide on a structure that could be made in the classroom.
2. Discuss the ingredients of good design.
3. Make a three view sketch of the design.

Relationships:

1. Mathematics: Measurements.
2. Art: Drawing a design.

Tools and Materials:

Paper and ruler.

Bibliography:

Townsend, Gilbert, and Dalzell, J. Ralph, How to Plan a House, American Technical Society, Chicago, 1958, pp. 102-137.

CONSTRUCTION

Assignment: 9 Grade Level: 3-4

Title; Steps in Designing and Engineering a Construction Project

Definition: The steps in designing, with an understanding of the type of structure to be designed, requires preliminary drawings, each showing a different approach, analyzed to consider aesthetic and practical applications and refined for selection.

Objectives: As a result of the learning experiences the students should be able to design a structure that could be made in the classroom; define the steps in making a design; make a three view drawing of a simple structure; build structure according to design.

Activities:

1. Discussion and selection of design.
2. Sketching a design.
3. Drawing the design.
4. Building the designed structure.

Teaching Procedure:

1. Discuss and decide on structure, some examples: bird house, bird feeder, doll house, moldel house, strucutre of toy building sets (Lego, Structo, Erector).
2. Make a freehand sketch of design.
3. Discuss problems of materials and construction.
4. Make a three view drawing of design. Children may do or assist. (Front, top, side)
5. Use instruction booklet when using building sets.

Relationships:

1. Mathematics: Measuring.
2. Reading: Reading directions.
3. Art: Drawing sketches.

Tools and Materials:

Paper, ruler, building sets or materials.

Bibliography:

Townsend, Gilbert and Dalzell, J. Ralph, How To Plan A House, American Technical Society, Chicago, 1968, pp. 102-137.

CONSTRUCTION

Assignment: 10 Grade Level: 3-4

Title: Drawing Plans

Definition: Drawing plans is the process of making a detailed record of the appearance of an object.

Objectives: As a result of the learning experiences the students should be able to make a simple line drawing showing the floor plan of his own home; make a simple drawing showing the exterior appearance of the front of his home; collect magazine pictures of the several rooms in a home; arrange magazine pictures in book form and write a brief statement about the function of each room.

Activities:

1. Using coordinate graph paper, make a floor plan sketch of his own home.
2. Draw an exterior front view of his own home, and use crayons to color.
3. From magazines, collect pictures of living rooms, bedrooms, bathrooms, and kitchens.
4. Paste magazine pictures of rooms in a notebook and write a short paragraph about the purpose of each room.

Teaching Procedure:

1. Discuss the types of rooms commonly found in homes and the function of each room.
2. Assist students in collecting magazine pictures of rooms, and show them how to arrange these pictures in notebook form.
3. Show several examples of simple floor plan drawings.
4. Using chalkboard or overhead projector demonstrate how to make a simple line drawing of a floor plan layout on coordinate graph paper.

Relationships:

1. English: Sentence structure and
2. History: Types of houses through man's history.
3. Geography: Homes in different cultures of the world.
4. Mathematics: Measurement, proportion, and layout.
5. Social Development: Family life and the home.

Tools and Materials:

Coordinate graph paper, pencil, ruler, crayons.

Bibliography:

Fleming, Joseph W., Barich, Dewey F., and Smith, L. C., Applied Drawing and Sketching, American Technical Society, Chicago, 1953.

CONSTRUCTION

Assignment: 11 Grade Level: 3-4

Title: Selecting a Builder

Defintion: Selecting a builder is the process of judging which person is best qualified to perform the construction needed.

Objectives: As a result of the learning experiences the students should be able to write a simple description of the work performed by carpenters, plumbers, electricians, brick masons, and painters; discuss in class how these tradesmen must all work together in order to construct a building.

Activities:

1. Role playing with groups of students taking the roles of carpenters, plumbers, electricians, brick masons, and painters. The teacher acting as the contractor.
2. A house is constructed in the classroom with the carpenters making holes for windows and doors in cardboard boxes. The plumbers then put toy model sinks in place, and the electricians place a small lamp in the house and plug it into the classroom outlet. The brick masons build up toy bricks around part of the outside, and painters apply one coat of water base paint.

Teaching Procedure:

1. Discuss with the students the work of the various tradesmen required to construct a house.
2. Extend this discussion to emphasize how the tradesmen work together when constructing a house.
3. Organize students into groups for role playing.
4. Play the role of contractor and help students construct a model house in the classroom.

Relationships:

1. Social Development: Working together.
2. Social Studies: Occupations.
3. Mathematics: Measurement, layout, paint mixing
4. English: Sentence structure and grammar.

Tools and Materials:

Large cardboard boxes, scissors, knives, toy sinks, small lamp, water base paint and brushes, toy building bricks.

Bibliography:

Gilbert, Harold G., Children Study American Industry, William C. Brown Co., Dubuque, Iowa, 1966.

Willoughby, George A., and Risk, Norman, Construction Projects for Elementary Grades, Royalle Publishing Co., Inc., Detroit, 1958.

Assignment: 12 Grade Level: 3-4

Title: Listing Materials

Definition: Listing materials is the process of making an account of all items required to construct an object.

Objectives: As a result of the learning experiences the students should be able to make an accurate list of all the materials needed to construct a play store in the classroom.

Activities:

From a drawing of a play store, determine the following material requirements.

a. Type of material.
b. Number of pieces.
c. Dimensions of each piece.

Teaching Procedure:

1. Introduce the project of building a play store in the classroom.
2. Discuss the advantage of listing the materials required before constructing the project.
3. Show class a large drawing of the play store.
4. Give the students a format to use in listing the materials.

Relationships:

1. Mathematics: Measuring and dimensioning.
2. English: Writing specifications.

Tools and Materials:

Drawing of play store, pencil and paper, ruler.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Company, Milwaukee, 1959.

CONSTRUCTION

Assignment: 13 Grade Level: 3-4

Title: Collective Bargaining, Handling Grievances

Definition: Collective bargaining is a method of negotiating for the settling questions of hours, wages, working conditions, fringe benefits, etc. between comployers and employees. Handling grievances is a method of negotiating differences between employer and employee.

Objectives: As a result of the learning experiences the students should be able to explain and identify two needs for workers to use grievance procedures for the solution of problems; identify two differences between grievances covered by a collective bargaining agreement and those not covered; identify three needs for collective bargaining agreements between the employer and employee.

Activities:

1. Use collective bargaining procedures to arrive at an agreement for grading students on a particular project.
2. Draw up a collective bargaining agreement to play a game of baseball on the school playground using rules and regulations, differing from the major leagues.
3. Use role playing to solve a student grievance on the average amount of time spent for homework.

Teaching Procedure:

Students are given projects to make that relate to a unti they are studying in social studies. (such as a unit on Indians) The students will be making log cabins, forts, covered wagons, etc. Set up collective bargaining procedures and draw up an agreement with student participation. This agreement will include the number of points to be given for each student project in such areas as neatness, finish, creativeness, etc..

Relationships:

1. Social Studies: Learning the role of unions and management.
2. Language Arts: Learning the correct word usage in role playing activities and articulation.

Tools and Materials:

Paper, pencils.

Bibliography:

--------------, World Book Encyclopedia, Field Enterprises Ed. Corp., Chicago, Illinois, 1965, pp. 2-17, Volume L.

Scott, William G., The Management of Conflict; Appeal Systems in Conflict, Homewood, Illinois, 1965.

Van Mol, Louis J., Effective Procedures for the Handling of Employee Grievances, Public Personnel Association, 1961.

CONSTRUCTION

Assignment: 14 Grade Level: 3-4

Title: Hiring Construction Personnel, Training and Educating for Construction, Working Conditions, Advancing in Construction.

Definition: The hiring of qualified people to do construction work. The training and educating these people to perform their tasks in a desireable manner under adequate present day working conditions so they can move up the "ladder of success."

Objectives: As a result of the learning experiences the students should be able to identify at least 2 methods used to hire construction personnel, identify at least 3 satisfactory and 3 unsatisfactory working conditions for an engineer, a skilled tradesman, or a man in management; explain acceptable training and education requirements for a tradesman, an engineer, a person in management; and identify common procedure for advancement in a trade, and engineering field, a person in management.

Activities:

1. Set up a small contracting firm in the classroom and construct small lawn ornaments out of concrete.
2. Use role playing to hire personnel, train them, and agree on satisfactory working conditions in order to build a bridge in a classroom.
3. In an English class discuss the hiring, educating, and advancement in construction and working conditions. Then, have the students write a paper concerning all of the areas. Each student chooses or is assigned a different job title for a topic in construction for writing his English paper.

Teaching Procedure:

1. Class decides to build some type of a bridge.
2. They decide what personnel training and education is required for each of the working conditions, and how the personnel can advance.
3. Then, hire members of the class to perform each of the jobs needed, educate or train them and then construct a bridge in class.

Relationships:

1. Mathematics: Learning formulas, fractions, and ratios.
2. Social Studies: Learning the need for training and education and good working conditions.
3. Art: Learning the need for design in construction.
4. English and Language Arts: Learning how to put their thoughts into words in writing a paper.

Tools and Materials:

Wood, 100 foot roll of 14 gauge steel wire, saw, hammer 4 penny nails, wire nippers.

Bibliography:

Weinland, James D., Personnel Interviewing, Ronald Press, 1952.

CONSTRUCTION

Assignment: 15 Grade Level: 3-4

Title: Construction Production Technology

Definition: Construction Production Technology is the changing of the form of material through combining, forming, and separating them on the site.

Objectives: As a result of the learning experiences the students should be able to define what is meant by construction production technology; define construction; define production; and explain at least one example of post processing.

Activities:

1. Make papier mache puppets.
2. Make a paper cut-out Pilgrim for Thanksgiving.
3. Make a decorative red and green chain for Christmas.

Teaching Procedure:

1. Tear up paper.
2. Soak it in water
3. With flour and water or other paste mixture form a hand puppet for students design from the papier mache.
4. After it dries decorate it with water colors.

Relationships:

1. Art: Learning design, how to draw, color, and paint.
2. Social Studies: Learning about production, construction, and technology.
3. Language Arts: Acting out roles of the people. Improving articulation.

Tools and Materials:

Paper, flour and water, proper paste for paper, water colors.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Company, Milwaukee, 1959.

Moore, Hamberger, Kingzett, Handcrafts for Elementary Schools, P. C. Heath and Company, Boston, 1953.

Assignment: 16 Grade Level: 3-4

Title: Clearing the Site and Getting Ready to Build.

Definition: Is that process whereby the removal of trees, stones, excess dirt, is accomplished by the use of earth digging machines and other tools relating to this operation.

Objectives: As a result of the learning experiences the students should be able to acquire an understanding of hand tools and their use. Recognize and solve problems encountered when clearing a site. Have practical experience in clearing a lot.

Activities:

1. You are to assemble the hand tools needed to clear a site for construction.
2. List these tools and how they are to be used in the removal of building obstructions.

Teaching Procedure:

1. Describe the type of lot or area to be cleared. Pay particular attention to the safety aspect of this operation: ie. ivy, sharp objects, proper use of sharp tools.
2. Have the students go out and by using the smaller tools, begin clearing the site of bushes, shrubs, and small trees.

Relationships:

1. Have students assemble a small village or development area in the classroom and by using models of equipment they play with, explain how they help the contractor clear the site. This could be a part of social studies in the classroom or in communicative arcs.

Tools and Materials:

Shovels, picks, rakes, pruning shears, toy models and saws.

Bibliography:

I.A.C.P. Text
American Home Builder (magazine)

CONSTRUCTION

Assignment: 17

Grade Level 3-4

Title: Locating the Structure

Definition: Locating the structure is that part of planning where the various conditions are considered and all specifications are met regarding zoning, building codes, and surveying a particular site.

Objectives: As a result of the learning experiences the students should be able to step off side lines in respect to the surveyors bench marks in the class room; and form a perfect square or rectangle by using bench mark.

Activities:

1. Take mason's cord and mark off the footing and basement dimensions in the classroom.
2. Use one corner as a reference point, then form a perfect rectangle.

Teaching Procedure:

1. In the classroom use a measurement of 1'x12' to form a building.
2. Measure in from each wall so that this 8'x12' will be centered in the classroom.
3. Set off within the 8'x12' rectangle a 1 foot perimeter wall that will act as a footing detail.

Relationships:

1. Mathematics: Measure your classroom and record these dimensions. On the chalkboard set off this procedure before doing it on the floor.
2. Reading: Look up terms and words that will appear in this unit.

Tools and Materials:

Yardstick, mason's string, 6 penny nails, hammer.

Bibliography:

The World of Construction, Industrial Technology I, Volume I, Unite 63.

18

CONSTRUCTION

Assignment: 18

Grade Level: 3-4

Title: Earthmoving

Definition: Earthmoving is that process where material characteristics of soil and rock is changed by the removal of spoil or loose materials from the site.

Objectives: As a result of the learning experiences the students should be able to excavate a area by sing toy machines; solve problems involved in earthmoving today; list the various types of jobs available in earthmoving.

Activities:

1. Take a field trip to a construction site and observe various methods employed in earthmoving.
2. Students will be able to excavate a area in their sand box with the use of toy movers.
3. Gather and label various rock and soil samples.

Teaching Procedure:

1. Divide the class into four groups. Allow each student to choose his group.
2. List the various headings on the chalkboard: Pushing Machines, Hauling Machines, Loading Machines, Scraping Machines.
3. Have the students cut out and collect pictures of various equipment and then determine to which category each piece belongs.
4. Form a picture chart of these various pieces of equipment and relate them to actual contracting jobs.

Relationships:

1. Social Studies: Make a study of machines and how they have helped man improve society.
2. Mathematics: Compute the amount of yards, tons, each type of hauling machine can carry.
3. Science: Test soils and use of fertilizer.

Tools and Materials:

Magazines, construction paper, scissors, paste, marking pens and pencils, crayons.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Company, Milwaukee, 1959, Chapter 4.

Assignment: 19 Grade Level: 3-4

Title: Classifying Structures

Definition: Classifying structures is the analyzing and grouping of constructed projects, based on intended use and the principal material used in constructing them.

Objectives: As a result of the learning experiences the students should be able to determine and state three used of different structures; explain three needs for various kinds of constructed projects; explain thee reasons for varied shapes of structures.

Activities:

1. Walk through a residential area, a business district, a manufacturing complex.
2. Write about sizes, uses and shapes of structures observed.
3. Cut from magazines, and display on bulletin board, pictures which will represent shapes and sizes of homes, offices, industrial plants, roads, towers, tunnels, bridges, utility networks, etc..
4. Build models of some of these projects from clay, earth, wood, concrete, metal, etc..

Teaching Procedure:

1. Discuss kinds of magazines where pictures can most likely be found.
2. Classify buildings, dams, highways, towers, utility networks, etc..
3. Do research regarding zoning restrictions pertaining to construction.
4. Lay out a plan of these constructed units in accordance with zoning regulations and needs.
5. Develop a plan of the town on the bulletin board.

Relationships:

1. Art: Mounting of pictures.
2. English: Write a story about one particular structure observed.
3. Social Studies: Discuss the effects of an industry upon the economy of the area.
4. Mathematics: Research the cost of a street, or part of a street.

Tools and Materials:

Magazines, art paper, scissors, paste, pencils, thumbtacks.

Bibliography:

Newkirk, Louis, Integrated Handwork. Silver Burdett Co., New York, 1940.

CONSTRUCTION

Assignment: 20

Grade Level: 3-4

Title: Setting Foundation Forms Containing Reinforcement

Definition: Setting foundation forms containing reinforcement features is the locating and positioning of structured temporary supports for concrete, into which permanent strengthening materials have been placed.

Objectives: As a result of the learning experiences the students should be able to set a foundation form; set and secure two applications of reinforcement rods.

Activities:

1. Make a paper weight with reinforcement.
2. Make a flat tile with reinforcement.
3. Make a tether ball base.
4. Make an animal feeding dish.

Teaching Procedure:

1. Dig hole in ground - square the sides and flatten the bottom to act as form.
2. Locate and secure the tether ball stand pipe in place.
3. Place reinforcement materials in position.

Relationships:

1. Mathematics: Measure hole to proper depth and diameter.
2. Social Studies: Display of good school citizenship.

Tools and Materials:

Shovel, or post hold digger, ruler, hammer, material to secure pipe stand in place, wire and few heavy stones.

Bibliography:

Olson, Delmar W., Industrial Arts in the General Shop., Prentice-Hall, Inc., New Jersey, 1961, pp. 292-295.

CONSTRUCTION

Assignment: 21 Grade Level: 3-4

Title: Completing Foundations by Mixing, Placing, and Finishing Concrete

Definition: Completing foundations by mixing, placing, and finishing concrete consists of pouring concrete into forms and smoothing the surface as the use dictates.

Objectives: As a result of the learning experiences the students should be able to screed concrete; finish concrete by the floating method; list sequentially the steps necessary to complete a form; mix concrete with correct proportions of each ingredient for a specific job.

Activities:

1. Set a bird feeder in a concrete base.
2. Make a folower planter which stands on a short pedestal, secured to a foundation.
3. Make a small animal feeder using concrete.

Teaching Procedure:

1. Choose mix that best satisfies the need.
2. Mix concrete according to specifications.
3. Place concrete in form after feeder base has been placed and secured.
4. Screed concrete to keep it level.
5. Float cement and water to surface of the concrete.
6. Finish as desired.
7. Allow concrete to cure.

Relationships:

1. Mathematics: Ratio of components of concrete.
2. Social Studies: Working as a small (classroom) society.

Tools and Materials:

Mortar box, hoe, trowel, screed tool, floating tool, concrete ingredients, form material, square and level.

Bibliography:

Olson, Delmar W., Industrial Arts for the General Shop, Prentice-Hall, Inc, New Jersey, 1961, pp. 292-295.

Bedel, Earl L., Household Mechanics, International Textbook Co., Scranton, Penn., 1949, pp. 182-184.

CONSTRUCTION

Assignment: 22 Grade Level: 3-4

Title: Building Superstructures

Definition: Building superstructures is the construction of an architechtural unit, above the ground, designed to rest upon and/or be fastened to a foundation.

Objectives: As a result of the learning experiences the students should be able to identify that part of a structure that rests on a solid base; to differentiate between substructures and superstructures.

Activities:

On an existing base, build a group of buildings similar to some found in your community, using small building blocks.

Teaching Procedure:

1. Emphasize the requirements that determine the size and features of community buildings.
2. Define the limits of the community.
3. Assign definite buildings to each child.
4. Stress planning and arrangement.
5. Use small toy cars and trucks and have children deliver goods or perform services in the model community.

Relationships:

1. Social Studies: A transportation unit stressing community services.
2. Science: Contrast the different building materials in the model community to the building materials in the actual community.

Tools and Materials:

Small building blocks, large work table, toy cars and trucks.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Company, Dubuque, Iowa, 1966, pp. 110-129.

CONSTRUCTION

Assignment: 23 Grade Level: 3-4

Title: Building Mass and Masonry Superstructures and Frames

Definition: Building mass masonry and superstructures and frames is constructing that part of a structure, which is bonded to and rests on a solid base, by joining together preformed units or by moulding materials into a desired shape.

Objectives: As a result of the learning experiences the students should be able to differentiate between frames or superstructures that are shaped by casting from those built from preformed units.

Activities:

1. For the sand table town of "OZ" mould the castle of the Wizard and build the yellow brick road through the town.
2. The Wizard's house could be cast in cement or plaster of paris using a small juice can for the mould. The bricks could be cast from a "Play Doh" type material using a toy brick moulding machine.

Teaching Procedure:

1. Emphasize the shaping of materials by the moulding process.
2. Show how to color the mortar mixture.

Relationships:

1. English: Project can be related to the story "The Wizard of OZ".
2. Mathematics: Estimate the number of bricks needed for the road.

Tools and Materials:

Cemant, Clay of plaster, sand, water, small juice cans, dry color, mixing spoon, plastic container for mortar, table knife.

Bibliography:

------------------, Portland Cement: What It Is And What It Does. Portland Cement Assn., Boston, Mass., Pamphlet E-102.

CONSTRUCTION

Assignment: 24 Grade Level: 3-4

Title: Erecting Steel Frames

Definition: Erecting steel frames consists of building the steel skeletons of structures.

Objectives: As a result of the learning experiences the students should be able to sketch a steel framed structure.

Activities:

Build the frame of a skyscraper from small tin cans.

Teaching Procedure:

Have each child build a skyscraper from selected materials to represent steel. Emphasize the concepts of weight, strength, stability, and size.

Relationships:

1. Art: Sketch the tin can or other skyscraper.
2. Mathematics: Compare the size of the skyscraper to an actual skyscraper to develop the idea of size relationships.

Tools and Materials:

Small juice cans or other model construction material.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Company, Dubuque, Iowa, 1966, pp. 124-129.

CONSTRUCTION

Assignment: 25 Grace Level: 3-4

Title: Building Wood Frame Superstructures

Definition: The wood superstructure of a house consists of that part of the house located above the basement foundation. One of several framing methods may be employed in constructing the various sills, floors, roofs, walls, ceilings, doors, and windows, depending on the type and style of house being built and the area of the country in which it is located.

Objectives: As a result of the learning experiences the students should be able to name the various stypes and types of wood construction used in building the roofs and walls of common homes.

Activities:

1. A paper containing pictures of various styles and types of wall and roof construction will be distributed. The problem will be to identify by name each of the pictures.
2. Have the students practice identifying styles of roofs and wall sections by cutting out pictures from various magazines, newspapers; four of each style.
3. Have the students build a teaching machine which shows all the styles of roofs and wall sections.

Teaching Procedure:

With the use of those teaching aides available, such as; models, pictures, overlays, drawings, show the students the various types of wall and roof construction principles.

a. Compare these various styles and types as they are used in various parts of the United States.
b. Explain the advantages of the various styles and why each is used.
    (1) Identify those used most often in the students home community.

Relationships:

1. Science: Show types of woods used in building construction. Tell about nominal and dimension sizes of lumber. Tell how bracing can be used to strengthen a house. Tell how shingles are made and laid. Tell how sheathing, insulation, siding, etc., are manufactured and put in place and talk about heat transfer. Talk about nails and other holding devices used in wood and their holding power. Identify types of sills, doors, windows, and other related parts of the building.
2. Mathematics: Estimate how many square feet of roof a "square" of shingles will cover.

Tools and Materials:

8 1/2" x 11" sheets of paper, old magazines, newspapers, models, teaching aides, filmstrips.

Bibliography:

Feirer, John L., Woodworking For Industry. Peoria, Illinois, Charles A. Bennett Company, Inc., 1963.

CONSTRUCTION

Assignment: 26 Grade Level: 3-4

Title: Installation of Heating and Air Conditioning Utilities

Definition: The utilities of a building are those items added to a building which help in making it more useful and functional in terms of its intended use. Heating and air conditioning are parts of these and are highly important to the comfort and performance of persons working or residing in buildings during the various seasons of the year.

Objectives: As a result of the learning experiences the students should be able to identify various types of gas, oil, and electrical heating and air conditioning units used in their own home or at school.

Activities:

1. Visit a retail store handling all types of heating and air conditioning units and identify each.
2. Visit the school heating and circulating plant, explain its operation and how the hot and cold air or water, etc., its transferred to the rooms.
3. From newspapers or magazines cut out a series of pictures descriptive of three types of units and paste these into a booklet for class use.

Teaching Procedure:

1. Set up field trips for students to view various types of heating and air conditioning units. (retail store or at school, etc.)
2. Have students find out what kind of heating or air conditioning units are used in their own home or at school.
3. Discuss how hot or cold air is circulated in the school or in their own homes. Importance of volume of air being displaced.
4. Discuss how temperature is controlled in their homes or at school.
5. Discuss the effects of temperature upon people while at work, play or at home.

Relationships:

1. Science: Transfer and transportation of hot or cold air.
2. Social Studies: Effect of heat or cold upon peoples of the world and persons working in various occupations. Jobs people have as a result of the heating and air conditioning of homes, school's or office's.
3. Mathematics: Estimate the volume of air contained within the classroom.

Tools and Materials:

Paper for making a booklet or other computations, old newspapers and magazines for cutting out heating and air conditioning ads, and paste.

Bibliography:

Mechanix Illustrated How-To-Do-It Encyclopedia, New York, Fawcett Publications, 1961, pp. 8-29, Volume I, 1588-1527, Volume IX.

Burgess H. Jennings, Heating and Air Conditioning, Scranton, International Textbook Co., 1956.

CONSTRUCTION

Assignment: 27 Grade Level: 3-4

Title: Installation of Plumbing and Piping Systems

Definition: Installation and construction of plumbing and piping utilities affects directly the intended usefulness of a building. The purposes of these systems may be many and varied but typically might include the transportation of waste products, raw materials, or finished products.

Objectives: As a result of the learning experiences the students should be able to differentiate between plastic, steel, and copper tubing, telling where each might be used and where the students have seen them used.

Activities:

1. Using samples of pipe, pipe fittings and other pipe materials, identify them by naming the material from which each is made.
2. Field trips to building sites and manufacturing plants for the purpose of showing what pipe is made from and where and for what purpose it can be used.
3. Measure the wall thickness of various types of pipe.

Teaching Procedure:

1. Display, describe, and label the various types of pipes and fittings explaining the purpose and use of each to the class.
2. Through all types of visual aids depict the piping industry.
3. Conduct field trips to building sites showing piping installations and discuss the use of the various types of pipe on the job site.
4. If possible, visit a plant manufacturing pipe.

Relationships:

1. Science: Discussing the properties of materials.
2. Social Studies: The study of the piping industry and its workers and products.
3. Mathematics: Measuring the inside and outside diameters of pipe to compute wall thickness.

Tools and Materials:

All types of visual aids including films on piping industry. Samples of all types of fittings and piping materials.

Bibliography:

Mechanix Illustrated, How To Do It Encyclopedia, New York, Fawcett Publications, Inc., Volume 12, p. 2242, Volume 13, p. 2306.

Mutter, Lawrence P., Plumbing, United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D.C., Government Printing Office. 1946.

CONSTRUCTION

Assignment: 28 Grade Level: 3-4

Title: Installing Electrical Power and Communication Systems.

Definition: Installing electrical power systems consists of outside work done by linemen, inside work by wiremen while communication workers install manufactured products.

Objectives: As a result of the learning experiences the students should be able to list two reasons for insulation on wire; identify the production of electrical power and how it is delivered; differentiate between conductors and non-conductors of electricity. List two safety practices.

Activities:

1. Construct a simple battery operated fuse.
2. Construct a simple switch.
3. Make an inspection of the classroom and locate and count the number of switches.
4. Design a chart and gather different types and sizes of wire.

Teaching Procedure:

Demonstrate each of the following:

1. Cut a "V" in the end of one block 2" wide at the top and 1½" deep.
2. Nail blocks together to form a "T" with the "V" block on top.
3. Screw two paper clips to top of "V" as terminals.
4. Place a small piece of tin foil between paper clips.
5. Connect bell wire to screw terminals and run wire to battery poles.

Relationships:

1. Mathematics: Total the electric bill for the past six months at your house.
2. Language Arts: Compose a letter of invitation requesting the local electrical company to send a representative and talk about the job of a lineman.
3. Social Studies: Study the occupations related to the electrical industry.
4. Science: Review explanations as to the purpose of a fuse in an electrical system and its safety factors.

Tools and Materials:

Hammer, back saw, screwdriver, wood blocks 2" x3"x3/4", paper clips, bell wire, screws, nails, tin foil, and battery.

Bibliography:

Morgan, A., A First Electrical Book for Boys, Chas. Scribner and Sons,

Epsteen, First Book of Electricity, Franklin Watts Publishing Co., New York, N.Y..

CONSTRUCTION

Assignment: 29 Grade Level: 3-4

Title: Making Inspections

Definition: Inspection in the construction industry is the careful examination of the work being done to see if it meets written specification, plans, federal, state and local codes.

Objectives: As a result of the learning experiences the students should be able to identify the occupational traits necessary for good inspection; contrast present building materials with the early colonial times; and identify the various types of brick and stone used in construction.

Activities:

1. Inspect and strength test building materials.
2. Role play the occupation of the inspector.
3. Invite a safety inspector and have him discuss inspection proceudres.
4. Have audio-visual show a movie introducing the unit.

Teaching Procedure:

1. Have the children bring in four building materials to be tested: rock lath, copper pipe, insulation and flooring.
2. Rock lath is to be water-tested for disintegration.
3. Test insulation in mock-up wall for retention of heat and cold.
4. Compare a marred unfinished piece of flooring to one that has been finished.
5. Place water into a copper line, cap and freeze to demonstrate expansion of the formation of ice.

Relationships:

1. Mathematics: Make graphs on materials tested.
2. Language Arts: Write a story of an inspectors duties. Follow verbal instruction.
3. Social Studies: The relationships of inspection to our daily living.
4. Science: Scientific principles involved in the tests of materials.

Tools and Materials:

Hammer, rock lath, copper pipe, caps, water, solder, torch, insulation, flooring, shellac, varnish, brush, alcohol, and turpentine.

Bibliography:

Zim, Herbert S., Things Around The House, Wm. Morrow and Co., New York, 1954.

Holland, Janice, They Build A City, Charles Scribner and Sons, New York, 1953.

Anderson, L. D. and Heyer, P. C., France and House Construction, U. S. Department of Agriculture.

CONSTRUCTION

Assignment: 30 Grade Level: 3-4

Title: Mediation, Arbitration and Striking

Definition: A strike occurs when labor and management are unable to settle their differences. Mediation is accomplished by friendly intervention of a third party. Arbitration is the settlement of a dispute by persons chosen to hear both sides and come to a binding decision.

Objectives: As a result of the learning experiences the students should be able to list several disadvantages faced by a worker when he goes on strike; differentiate between mediation and arbitration; identify differences of opinion in order to reach a settlement in a dispute.

Activities:

1. Role play (two arguing children) bring in a sixth grader to act as a mediator.
2. Role play, father being on strike.
3. The role of an umpire in a ball game.

Teaching Procedure:

1. Discuss and demonstrate the organization necessary for role playing.
2. Form a mediation board.
3. Assign position to carry out board duties.
4. Discuss how successful conclusion can be accomplished.

Relationships:

1. Social Studies: Learning and understanding how to get along with people.
2. Language Arts: Art of discussion and role playing.

Tools and Materials:

Chalkboard.

Bibliography:

Lens, Sidney, Working Men, G. P. Putname and Sons, New York, 1960.

Coyne, Halsey, Shores, and Merit, Students Encyclopedia, Crowell-Collier Education Corporation, 1967, pp. 84, 474-491.

-------------, Living In The Modern World Volume II, Shelter Creative Educational Society, Mankato, Minn., 1954.

-------------, The World Book Encyclopedia, Field Enterprises Education Corp,, Chicago, 1965, pp. 2-17.

CONSTRUCTION

Assignment: 31 Grade Level: 3-4

Title: Enclosing Framed Superstructures

Definition: Enclosing framed superstructures consists of enclosing the exterior of a building with wood, metal, glass, paper, plastics, and masonry to protect the building from the elements.

Objectives: As a result of the learning experiences the students should be able to identify three types of roofing materials and describe when and where each should or could be used. Also explain cost, aesthetic charm and life expectancy of the material choosen.

Activities:

1. Have a class project where three lean-to roofs are built using each of the three materials displayed and discussed.
2. Show a movie showing different types of dwellings found around the world.
3. Have class discuss the reasons for the use of different types of building materials why, how, and when they are used; and the ability to stand up under the elements present.

Teaching Procedure:

1. Display several types of roofing materials.
2. With each material have a pamphlet available discribing the material and the availability of the product its characteristics, its durability, etc.
3. Have children cover a small surface with at least three of the materials displayed.
4. After the roof is completed have the sample roofs place outdoors to be exposed to the weather.
5. After a sufficient time of exposure to the elements have the children discuss was has occured since material has been exposed to the elements. Better still take a field trip in and around the local community and look for various types of roofs and discuss the positive and negative aspects of what is viewed.

Relationships:

1. Social Studies: Relationships of materials to countries.
2. Mathematics: Cost of materials, figure material requirements to cover specific area.
3. Health Education: How roofs help protect us from the elements thus creating healthful and comfortable situations.

Tools and Materials:

Tar, gravel, tar paper, asbeatos shingles, wood shake shingles, asphalt shingles, aluminum shingles, tile, corrugated iron and/or aluminum.

Bibliography:

Olson, Delmar W., Industrial Arts for the General Shop, 3rd Edition, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1968.

CONSTRUCTION

Assignment: 32 Grade Level: 3-4

Title: Surfacing Interiors:

Definition: Surfacing interiors is the application of ceilings, walls, and floors to make the building functional, and any other construction project such as ships, tunnels, towers, etc.

Objectives: As a result of the learning experiences the students should be able to identify two of the most used hardwood flooring materials, oak and maple, and identify two finishes, of homes, ships, gym floors, etc.

Activities:

1. Identify two hardwood flooring materials and compare two of the finishes.
2. Discuss why wood floors are less tiring to walk upon than concrete floors.
3. Identify flooring materials other than wood and concrete, such as those found in tunnels, bridges, highways, etc.

Teaching Procedure:

1. Display to students an unfinished piece of oak and an unfinished piece of maple. Have students feel, look at and discuss materials.
2. Have students examine and discuss two pieces of surfaced oak and maple.
3. Display and discuss a piece of oak and maple that have been prepared with; penetrating seal and finish, fast drying clear coat finish, slow drying high gloss finish.
4. Show and discuss advantages of several materials used on gymn floors, decks of ships, elevators, scaffolding, etc.

Relationships:

1. Science: Discuss the chemical differences in the various finishes used on floors, their strengths and weaknesses.
2. Social Science: Develop a unit on the lumbering and home construction industry.

Tools and Materials:

Unfinished oak and maple, surfaced oak and maple, finished oak and maple, three or more finishing materials.

Bibliography:

Feirer, John L., Woodworking for Industry, Chas. A. Bennett, Co., Inc., Peoria, Illinois, 1963, pp. 121, 597.

----------------, Combined Staffs, How-To-Do-It-Encyclopedia, Vol. 8, Fawcett Publications Inc., New York, 1961, pp. 1362-1369.

CONSTRUCTION

Assignment: 33 Grade Level: 3-4

Title: Finishing the Project

Definition: Finishing the project includes major processes of painting, decorating, installing trim, cabinets, and hardware, both functional and decorative, on bridges, highways, towers, homes, directional signs, harbors, tunnels, etc.

Objectives: As a result of the learning experiences the students should be able to identify and layout three electrical wiring symbols.

Activities:

1. Identify and layout three electrical symbols.
2. Design wall paper.
3. Differentiate between various paint finishes used in building construction, on metals, woods, highways, etc.

Teaching Procedure:

1. Display various electrical switches, outlets, etc., under each item have the symbol of the item displayed.
2. Discuss the item and point out the distinguising mark of each symbol.
3. Discuss, identify, and differentiate between the various electrical componetts found within the classroom and the school.

Relationships:

1. Drawing: Have students layout simple electrical symbols used in industry.
2. Science: Relate the study of switches, outlets, etc., unit on electricity.
3. Health Education: The importance of electricity in maintaining clean homes, washing machines, air coolers, dishwashers, cooking, etc.

Tools and Materials:

Outlet, pull switch, duplex convenience outlet, range outlet, dryer piptail, single pole switch, 3 way switch, power panel, plates for all named pieces, charts displaying electrical symbols.

Bibliography:

Buban, Peter, Schmitt, Marshall, Understanding Electricity and Electronics, McGraw-Hill Pub., San Francisco, California, 1962, pp. 14-17.

Feirer, John L., Working for Industry, Chas. A. Bennett Co., Inc., Peoria, Illinois, 1963, p. 70.

Lush, Clifford and Engle, Glenn, Industrial Arts Electricity, Chas. A. Bennett Co., Inc., Peoria, Illinois, Revised Ed. 1965.

CONSTRUCTION

Assignment: 34 Grade Level: 3-4

Title: Painting and Decorating

Definition: Painting and decorating consists of applying finishes to a surface for the purpose of preserving or enhancing it.

Objectives: As a result of the learning experiences the students should be able to apply correct finish on projects they have constructed: clean brushes and equipment: distinguish between rubber and oil base paint: use correct thinners for cleaning tools and for thinning paint.

Activities:

1. Make bulletin board display on exterior decorating and kinds of finishes that could be used.
2. Make bulletin board display on interior decorating and kinds of finishes used.
3. Finish any project constructed and have them explain why they chose that finish.

Teaching Procedure:

1. Discuss with class types of finishes used on exterior of buildings and homes.
2. Show samples of finishes, pictures of houses and buildings with different exterior finishes.
3. Have students cut out pictures and collect paint, stain chips and any other samples of exterior finishes from table which the teacher has collected from different paint stores.
4. Make up bulletin board.
5. Discuss bulletin board with students good points of any improvements they could make.

Relationships:

1. Mathematics: Layout and measurements.
2. Art: Design.
3. Social Studies: Sources of paint and stain.

Tools and Materials:

Colored paper, string, magazines, paste stapler, scissors.

Bibliography:

Groneman, Chris H., General Woodworking, Webster Div., McGraw-Hill Book Co., Third Ed. pp. 154-169.

Mechanix Illustrated, How-to-do-it Encylopedia, Volume 2, Fawatt Publication, Inc., Golden Press, New York, 1961.

CONSTRUCTION

Assignment: 35 Grade Level: 3-4

Title: Landscaping

Definition: Landscaping is the final operation to so arrange the effects of natural scenery over a given tract to produce the best aesthetic effect, considering the use to which the tract is to be put.

Objectives: As a result of the learning experiences the students should be able to construct plant flats; plant seeds; test soils and study drainage.

Activities:

1. Construct a plant flat.
2. Sketch a plot plan of a building and landscape it.

Teaching Procedure:

1. Have table top sandbox.
2. Have books, pictures on landscaping and draining.
3. Discuss with class why the use of drain tile.
4. Have students layout and install drain tile in sandbox.

Relationships:

Science: Soil conditions.

Tools and Materials:

Sandbox, straws, gravel, soil.

Bibliography:

-------------, Mechanix Illustrated, How-To-Do-It-Encyclopedia, Volume 8, 1961, Golden Press, New York, p. 1443.

CONSTRUCTION

Assignment: 36 Grade Level: 3-4

Title: Maintaining Property

Definition: Maintaining property is a systematic periodical inspection and maintence of a building and/or grounds.

Objectives: As a result of the learning experiences the students should be able to understand how poor soil is conditioned into soil that can be used to plant shrubs and trees.

Activities:

Plant a tree on school property.

Teaching Procedure:

1. Discuss soil and how to improve.
2. Discuss how to dig a hole for a tree.
3. Have students write and draw a diagram how a tree should be planted.
4. Plant the tree in the school yard.
5. Have the class discuss how and why it was done.

Relationships:

1. Social Studies: Type of trees and where they grow.
2. Science: Type of soils and how to condition them.
3. Art: Locate tree to add beauty to school property.

Tools and Materials:

Shovel, humus, tree, fertilizer.

Bibliography:

--------------, Mechanix Illustrated, How-To-Do-It-Encyclopedia, Volume 8, 1961, Golden Press, New York, pp. 1442-1452.

MANUFACTURING

MANUFACTURING

Assignment: 1

Grade Level: 3-4

Title: Man and Technology

Definition: Technology can be defined as man's knowledge of efficient and systematic application of producing and consuming materials to satisfy his needs and demands. It might also be defined as the human activity that changes the material world to satisfy our needs.

Technology is the process of putting science and invention to work. More specifically it might be described as the practical application of science and invention.

Objectives: As a result of the learning experiences the students should be able to state four ways technology helps man in his home; give three examples of technology used on the farm; list three ways technology helps people to make clothing; and define technology.

Activities:

1. Compile a list of products in the home which were made through the use of technology.
2. Make a bulletin board of pictures showing how science uses technology.
3. List ways technology may help us in the future.
4. Show how technology relates to the home, farm, safety, and science.

Teaching Procedure:

1. Divide the class into four groups; home, farm, safety, and science. Let each group through the use of a mural, models, or posters, or a combination of these show how technology is used today in their area to satisfy human needs. For example, the students in the science group could build models of simple machines such as the lever.
2. A good interchange of ideas should take place between students.

Relationships:

1. Safety: There are many ways technology has made the world a safer place in which to live.
2. Science: Technology has made scientific discoveries very useful to man.

Tools and Materials:

Paper, poster board, tempera paints, back saw, ½" pine, wire nails, and brads, hammers, glue, coping saw.

Bibliography:

----------------, The Book of Knowledge Encyclopedia.

----------------, World Book Encyclopedia, Chicago, Field Enterprises Corporation, 1965.

MANUFACTURING

Assignment: 2 Grade Level: 3-4

Title: The Beginning of Manufacturing and the Industrial Revolution

Definition: Manufacturing is an organized approach for making a product that man wants or needs. Manufacturing began in the home and through specialization, increased efficiency, and a demand for increased volume, resulted in the growth of industry to factory form. The Industrial Revolution resulted in the adoption of power driven machinery in almost every phase of production activity.

Objectives: As a result of the learning experiences the students should be able to give and list two reasons why manufacturing became organized; give two reasons why manufacturing moved from the home to the factory; give three major examples of inventions and machines which helped foster the Industrial Revolution.

Activities:

1. Use a simple assembly line process to show how products can be made much faster by simple assembly line techniques.
2. Make a notebook with pictures or drawings showing how manufacturing began and its progression through history to the present. This notebook could utilize the assembl line process in putting it together.
3. Make a number of display boxes for rocks, seed flats or other science or art activities.
4. Build models of some of the major inventions that brought on the Industrial Revolution.

Teaching Procedure:

Have each student choose and make a small section of a notebook showing how manufacturing began and progressed down through history. This notebook should include events which helped to product the Industrial Revolution. The notebook could be brought right up through present day manufacturing. Each student's individual section could be reproduced and combined with the other sections to form a booklet about the history of manufacturing. The booklet could utilize the assembly line process in putting it together. A linoleum block print could be used for the cover page.

Relationships:

1. Mathematics: Estimating the cost of each booklet.
2. Social Studies: Studying the development of the Industrial Revolution.
3. Reading: A great deal of reading would have to be done in order for the students ro write their booklet.

Tools and Materials

Linoleum block, ink, ditto masters, stapler, back saw, hammers, coping saws, glue, try square, hand drill, twist drills, wire brads and nails.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, Bruce Publishing Co., Milwaukee, Wisconsin, Chapter 4.

MANUFACTURING

Assignment: 3 Grade Level: 3-4

Title: Manufacturing and the Economic System; Manufacturing Technology

Definition: Manufacturing is the process which our economic system uses to efficiently maintain a high level of productivity. Manufacturing technology is the process of supplying mankinds wants and needs by means of tools and machinery in a plant.

Objectives: As a result of the learning experiences the students should be able to identify four small hand tools and tell about their use; explain two reasons why manufacturing is important to our country; effectively use four basic hand tools; define the words technology and manufacturing using his vocabulary level as a basis for his definitions.

Activities:

1. Demonstrate and explain the use of simple hand tools and show that manufacturing today is nothing more than a more sophisticated way of using tools.
2. Using charts and graphs show the importance of manufacturing to our economy.
3. Have children build several simple machines.
4. Using some basic hand tools build an abacus for each member of the class.

Teaching Procedure:

Let us say the class decides that they need an abacus. Divide the class into small groups and let them work out the various problems. Call them together at intervals to guide their progress. Groups could be divided according to: 1) design and engineering, 2) materials and supplies needed, 3) tools needed, 4) an assembly group to decide how to put the abacus together. After each group has worked out its problems have a spokesman for each group explain their part in planning the abacus. Now that the planning problems have all been solved the actual manufacturing operation can begin.

Relationships:

1. Mathematics: An abacus for each student should prove to be a very helpful teaching aid.
2. Social Studies: Using manufacturing in the classroom should help the student to understand our economic system.
3. Reading: Doing research in the encyclopedia about the abacus will give the children extra reading experience.

Tools and Materials:

½" pine, coat hanger wire, wooden beads or the students could make their own out of dowel rods, wire brads and nails, glue, sandpaper, clear finish, chart of hand tools, coping saws, files, hand drill, twist drills.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, The Bruce Publishing Co., Milwaukee, Wis., 1959, Chapter 4.

MANUFACTURING

Assignment: 4 Grade Level: 3-4

Title: Manufacturing Management Technology

Definition: Manufacturing management technology is the human activity dealing with man and his relationship to the processes of planning, organizing, and controlling the manufacturing processes.

Objectives: As a result of the learning experiences the students should be able to realize that the greatest resources of a country are the human beings who live there; understand why cooperation must take place between all the workers in order for any manufacturing to occur; explain why accurate planning must take place before a product can be manufactured.

Activities:

1. Use a flow chart to illustrate the division of labor in industry.
2. Have the manager or owner of a small plant come in to discuss his responsibilities with the children and list what his job involves.
3. List some desirable characteristics of leadership and followership.
4. Set up several hypothetical manufacturing plants and let the children involve themselves in the role of management, role playing.

Teaching Procedure:

Depending on the number of students, break the class into three or four groups. Let each group represent the management of a different company. Give the members of each company a management role to play. The roles would involve controlling, organizing, and planning the operations of the company. Titles for the various roles could be printed and mounted in some way to add realism to the management dramas. An actual manufacturing operation could evolve from each group. (A list of guidelines should be given to each group to help keep them on the right track.)

Relationships:

1. Mathematics: Estimating costs.
2. Language Arts: In order for the children to organize their company they will have to do a lot of communication.

Tools and Materials:

Poster board, lined paper, graph paper, rulers, felt pen, coat hanger wire.

Bibliography:

Larsen, Delmar L., and Nelson, Herbert L., Elementary School Industrial Arts, Selected Readings and Resources, Eastern Michigan University, Ypsilanti, Michigan, 1968, p. 172.

Assignment: 5

Grade Level: 3-4

Title: Inputs to Manufacturing, Organization, Ownership, and Profit

Definition: The materials for manufacturing come from genetic reproduction, extractive processes, and industrial material production. The early industries were controlled by single families, but at the present time, corporate enterprises under the ownership and ultimate control of many individuals produce the majority of the goods. The major motive for manufacturing is profit.

Objectives: As a result of the learning experiences the students should be able to diagram a simple chart showing the three primary sources of materials; identify profit as the motivating force behind manufacturing; diagram the corporate structure within industry; define the extractive and reproductive processes as they apply to manufacturing.

Activities:

1. List examples on the board of various materials familiar to the students and have them tell the source of each.
2. Make a bulletin board for each of the three sources of industrial materials and have the students bring in pictures to illustrate some of the common materials.
3. Build a model of an open pit mine to show how materials are obtained from extractive processes.
4. Develop simple charts showing organization and structure of manufacturing industries.
5. List some of the ways wood (reproductive) is used in manufacturing.

Teaching Procedure:

Divide the children into several groups to build a model of an open pit iron mine. Each group should research and develop the plans for their particular part in building the model. The students could also build small trains, trucks and power shovels for moving the materials out of the mine. After the mine is completed, a discussion could take place on how to make the mine useful after it is abandoned. An example would be to convert it into a lake for recreational activities.

Relationships:

1. Science: Study of the earth's properties in researching the model mine and the uses of the mine's natural resources.
2. Mathematics: Estimating measurements for building the mine.
3. Reading: Extended technical vocabulary concerning mining; experience in note taking and relating written material to a practical problem.
4. Social Studies: How to make the mine useful to the community after its natural resource has been exhausted by the mining company;conservation.

Tools and Materials:

Sand, spackling compound or plaster, 3/4" plywood, ½" pine, tempera paints, back saw, coping saw, hammers, glue, wire nails,and brads, trowel, wire mesh.

Bibliography:

Roy, Mary Massey, Probe, A Handbook for Teachers of Elementary Science, Educational Service, Inc., Stevensville, Michigan, 1960, pp. 119-142.

Assignment: 6 Grade Level: 3-4

Title: Identifying Consumer Demand

Definition: The process of finding out what people will buy, would like to buy, or would not buy through various kind of surveys is consumer demand.

Objectives: As a result of the learning experiences the students should be able to demonstrate by example what consumer demand is; explain why identifying the consumer demand for a product is important to the manufacturing industry.

Activities:

1. Set up a small grocery store and then have the students make up a list of what they would like to have in their store.
2. Make a batch of ice cream for the class and appoint a group to survey the class to find what is their favorite flavor.
3. Have the students each design a toy that they would like to have and check its appeal to the members of the class.

Teaching Procedure:

Let each of the students design or invent a toy that they would like to have. The designing can be done on graph paper if this will help the children. (This section could be combined with the unit on design and planning.) Choose a committee to pick three of the best designs. Next let the class play the role of possible consumers. Now let one of the students play the role of the survey taker. His job is to find out which toy each member of the class would buy. The results can be tabulated on the board by one of the children. When the survey is complete, the consumer demand can be established by the facts and figures on the board. This activity could lead on into acutal manufacturing.

Relationships:

1. Art: How response to the eye appeal of design and color affect consumer demand.
2. Mathematics: Practical uses of graphs and charts and the relationships of numbers.
3. Social Studies: How cultural influences affect manufacturing.

Tools and Materials:

Graph paper, crayons, plain paper, heavy paper for fold-up designs, scissors.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Co., Dubuque, Iowa, 1966, p. 25.

MANUFACTURING

Assignment: 7 Grade Level: 3-4

Title: Researching and Developing

Definition: Research is the careful investigation by scientists and technicians directed toward the discovery of new materials, efficiency in production, and interpreting the findings for the development of new ideas and products.

Objectives: As a result of the learning experiences the students should be able to explain what researching and devloping means; state in his own words that research involves three basic steps: a) describing-defining the problem, b)retrieving-getting information, and c) experimenting-testing and recording results; follow the researching and devloping process in thinking about a simple product which could be manufactured.

Activities:

1. Set up a research department with the students being the researchers. Let the children conduct research on an experimentation with many different kinds of materials.
2. Let the students research on how to make paper and let them actually develop the process of making paper.

Teaching Procedure:

1. Show a film on paper making, or visit a paper mill.
2. Define and analyze the process of paper making.
3. Demonstrate the paper making process; making the pulp, producing sheets, etc.

Relationships:

1. Science: Use of natural materials in the production of manmade products.
2. Social Studies: Development of paper through time, history and spread of use, extending to include history of communication and onset of printing.
3. Mathematics: Use of measurements and quantities.
4. Reading: Increase in vocabulary and reading for information.
5. Art: Designing and printing letterheads.

Tools and Materials:

Bulk paper pulp or tissues, dishpan, laundry starch, measuring cups, egg beater, gasoline, screen and glue, or send for kit from Hammermill Paper Co., 1581 East Lake Road, Erie 6, Pennsylvania.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Co., Dubuque, Iowa, 1966, pp. 144-146.

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, The Bruce Publishing Co., 1959, p. 112.

MANUFACTURING

Assignment: 8 Grade Level: 3-4

Title: Designing Manufactured Goods

Definition: Designing manufactured goods is the process by which manufacturers plan their products so they will be attractive to, and of more use to the consumer. Many factors, such as cost, quality, available machines, and consumer needs, are considered before the final design for a product is accepted and manufactured.

Objectives: As a result of the learning experiences the students should be able to illustrate the importance of design to the manufacturing process; see that good design involves some basic steps that should be followed in developing a design or an idea.

Activities:

1. Let the children design a piece of jewelry they would like to make.
2. Let the children work out the design of a simple scrapbook or notebook cover which they could silkscreen and manufacture in quantity.
3. Working with the children help them design their dream house.

Teaching Procedure:

Today your class represents the cover design department of a large national magazine. Now in letting the children design a cover for a notebook or scrapbook, you should establish some criteria for them to follow. The list of criteria will give the students a basic outline they can follow in arriving at a good design solution to their problem. After all the designs are in, they can be discussed, the best parts being drawn from each one. Now let a small group work out the final design which represents the original designs of each student. Next is the actual production using the silk screen process.

Relationships:

1. Mathematics: Measurement, use of rulers, application of basic shapes.
2. Social Studies: How culture dictates what is useful and what is pleasing in design.
3. Art: How materials lend themselves to various designs and visa versa. The technicques of silk screening.

Tools and Materials:

Paper, graph paper, crayons or other coloring media, silk screen equipment and supplies, poster board for final design, rulers.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Co., Dubuque, Iowa, 1966, p. 135.

MANUFACTURING

Assignment: 9 Grade Level: 3-4

Title: Creating Alternate Design Solutions; Making Three-Dimensional Models

Definition: Alternate design solutions are worked out in case the original designs prove faulty. After the design is selected models or prototypes are made to test the functional requirements of the design.

Objectives: As a result of the learning experiences the students should be able to understand why alternate designs are made; explain the importance of testing functional requirements on a prototype or model before it is put into production.

Activities:

Design space ships or rockets (alternate design solutions to Apollo) and then build working models.

Teaching Procedure:

1. Using space ships as an example, show the importance of design, alternate design, and prototypes or models.
2. Have each student design and build a small rocket of his own which can be fired off at a later date.

Relationships:

1. Science: Demonstrates the principles of flight, gravity, thrust, and lift.
2. Language Arts: Recognition of aerospace science vocabulary.
3. Mathematics: Dealing with problems of time, distance and speed.

Tools and Materials:

Posterboard, cardboard tube, launching platforms.

Bibliography:

Air World Education Distribution Center, Trans-World Airlines Inc., Kansas City 8, Missouri.

National Aeronautics and Space Administration, Public Information, 1520 Fourth Street, N.W., Washington, D.C., 20025

National Aviation Education Council, 1025 Connecticut Avenue, N.W., Washington, D.C., 20006

MANUFACTURING

Assignment: 10 Grade Level: 3-4

Title: Refining the Design Solution

Definition: Refining a design is improving the original design as conceived by the designer.

Objectives: As a result of the learning experiences the students should be able to experiment with materials and list two characteristics of materials that contribute to a good design; construct a refined model of a previous model design.

Activities:

1. Make and improve a design to show the following: square, circle, rectangle, and triangle.
2. Refine a rough design for display boxes.

Teaching Procedure:

1. Demonstrate on the chalkboard a square, circle, and a triangle.
2. Demonstrate the use of a compass and a rule in the formation of geometric shapes.
3. Demonstrate to pupils how to improve on an original design and the things that need to be considered.

Relationships:

1. Mathematics: Pupils will develop the concept of geometric figures and how to use the compass accurately.
2. Art: Student will learn how to improve on an existing design.

Tools and Materials:

Pencil, paper, compass and rule or a material of the instructors choice.

Bibliography:

Platts, Mary E., and Platts, Gordon H., Create: A Handbook for Teachers of Elementary Art, Educational Service Inc., Benton Harbor, Michigan, 1966, p. 62.

MANUFACTURING

Assignment: 11 Grade Level: 3-4

Title: Engineering the Product

Definition: Engineering a product is discovering a solution to a problem through analysis; deciding upon a solution to be used in obtaining the finished product.

Objectives: As a result of the learning experiences the students should be able to list the parts necessary to make stilts; measure lengths to within ¼"; draw a dimensioned plan for stilts.

Activities:

1. Make stilts.
2. Prepare first aid kit.
3. Design and make puppets.
4. Design and make candles.

Teaching Procedure:

1. Discuss the various purposes for which stilts are used (Plasterers, for for example).
2. Show factors that governed the design of stilts.
3. Demonstrate how plans of stilts are drawn.
4. Have pupils draw a stilt plan showing dimensions.
5. This plan should include a bill of materials or parts list indicating the name, size, quantity, and kind of material of each part.

Relationships:

1. Social Studies: For recreational purposes of certain countries.
2. Mathematics: Making height for painting etc.

Tools and Materials:

Pencil and paper.

Bibliography:

Platts, Mary E., and Platts, Gordon H., Create - A Handbook for Teachers of Elementary Art, Educational Service, Benton Harbor, Michigan, 1966, pp. 141-148.

Assignment: 12 Grade Level: 3-4

Title: Designing Power Elements

Definition: Designing power elements is determining the power requirement necessary for the job or project and designing the equipment necessary to meet those requirements.

Objectives: As a result of the learning experiences the students should be able to determine the necessary power to do a job or project; distinguish the difference between the three water wheels. (overshot, breastshot, undershot)

Activities:

1. Make a model water wheel.
2. Make a model windmill.
3. Construct a telegraph set.

Teaching Procedure:

1. Have pupils draw a cardboard disk using a templet.
2. Mark center hole and fin spots.
3. Cut soda straws 1½" long.
4. Fasten soda straws on disk with glue.
5. Glue another cardboard disk to opposite side.
6. Drill center hole and insert axle.

Relationships:

1. Mathematics: Developing the concept of geometric figures.
2. Science: Showing how water is used as a source of power.
3. Art: Decorating the wheel with straws.

Tools and Materials:

Coping saw, tin snips, glue, soda straws, cardboard, and pencil.

Bibliography:

Los Angeles City Schools, Industrial Arts Instructional Guide for Grades K-6, Division of Instructional Services, Publication No. EC-150-1963 Revision, Los Angeles, California, pp. 30, 87-89.

Mager, Robert F., Preparing Instructional Objectives, Fearson Publishers, Inc., Palo Alto, California, 1962, p. 24.

MANUFACTURING

Assignment: 13 Grade Level: 3-4

Title: Making a Working Drawing

Definition: A working drawing is one which contains all the information necessary to make a part, object, or product.

Objectives: As a result of the learning experiences the students should be able to sketch on graph paper, simple objects made up of straight lines.

Activities:

1. Using graph paper, students are to practice drawing series of horizontal, vertical, and diagonal lines.
2. Using graph paper, students are to sketch objects made up of simple lines.

Teaching Procedure:

1. Discuss straight line objects in terms of front, top, and side views.
2. Using the chalkboard and straight line objects as models, demonstrate how to sketch their various views.

Relationships:

1. Health and Physical Education: Provides practice in hand-eye coordination and large and small muscle development.
2. Language Arts: Assists in the development of reading, skill, since almost all books and magazines contain so many drawings.
3. Mathematics: Develops an understanding of parts in relationship to the whole.
4. Art: Development of and appreciation of relative shape and size.
5. Social Studies: Develops an appreciation of drawing in relationship to the progress of man.

Tools and Materials:

Graph paper, pencils, erasers.

Bibliography:

Feirer, John L., Drawing and Planning for Industrial Arts, Chas. A. Bennett Co., Peoria, 1963, pp. 15-16.

MANUFACTURING

Assignment: 14 Grade Level: 3-4

Title: Building the Production Prototype

Definition: A production prototype is a model that acts as a standard from which to make a reproduction - with or without a change.

Objectives: As a result of the learning experiences the students should be able to develop a production prototype from a working drawing.

Activities:

Working from a set of working drawings, students are to develop an object made of styrofoam.

Teaching Procedure:

1. Discuss the importance of the prototype and its use.
2. Using a working drawing and a pencil, draw a layout on styrofoam.
3. Demonstrate how styrofoam is cut with a coping saw.

Relationships:

1. Social Studies: How natural resources can be converted into useful products. How technology improves living conditions.
2. Science: How tools are simple forms of levers and machines.
3. Mathematics: Illustrates the importance of numbers in every day living.
4. Art: Develops skill in the use of tools that can be used in creating art forms.

Tools and Materials:

Pencil, coping saw, styrofoam.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, The Bruce Publishing Co., Milwaukee, 1959, pp. 95-97.

MANUFACTURING

Assignment: 15 Grade Level: 3-4

Title: Planning Production

Definition: Planning production is a detailed and systematic series of activities leading up to the output of a product.

Objectives: As a result of the learning experiences the students should be able to list the steps in a plan of procedure for making a one piece plastic product; select suitable materials from a choice of five and list two tools needed for the construction of simple plastic products.

Activities:

1. Students are to design and plan a one piece plastic product.
2. Students are to experiment with various types of plastic and hand tools.

Teaching Procedure:

1. Discuss the basic characteristics of various plastics and their uses.
2. Demonstrate how different tools can be used for laying out, cutting, shaping, and finishing plastics.

Relationships:

1. Science: How plastics are made from coal, air, and water.
2. Mathematics: Assists in developing the concept of size and weight.
3. Social Studies: Develop an appreciation of the use of plastic in every day living.

Tools and Materials:

Plastic, pencil, paper, various types of hand tools.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Company, Dubuque, Iowa, 1966, pp. 9-16.

MANUFACTURING

Assignment: 16 Grade Level: 3-4

Title: Planning Processes

Definition: Planning processes consists of detailed schedule of manufacturing processes or steps in producing a product.

Objectives: As a result of the learning experiences the students should be able to relate to the teacher the processes employed in producing a colored, paraffin candle of uniform color and texture.

Activities:

1. After a candle design has been selected, the children help list the various steps or processes necessary for the production of a colored paraffin candle.
2. Other ideas might include: Planning for soap production, occasion cards from linoleum block and potato prints, etc.

Teaching Procedure:

1. Discuss how candles were made in the past and elaborate on modern manufacturing.
2. After a design has been selected, each student should recognize each process in the manufacture of candles.
3. Divide the class into process groups:
   a. wax formula process group-wax, scent, color, etc..
   b. molding process group-charge of molding the wax (hot or cold).
   c. product removal group-remove product from mold.
   d. finishing process group-remove flash, decorate, etc..
   e. Quality control group-assure product meets specifications.
   f. packaging process group-package for consumer.

Relationships:

1. Mathematics: Preparing the formula and mixing the wax.
2. Economics: The value and significance of the candlemaking industry.

Tools and Materials:

Work station areas for each process group.

Bibliography:

Making Honeycomb Candles, Kap-Pak Products, Chicago, Illinois, 1960.

American Handicraft, Holiday House and other general craft catalogues usually contain booklets on the art of candle craft. The Coop-Credit Assoc. out of Kansas City. Kansas has a booklet called Glo-Candles.

MANUFACTURING

Assignment: 17 Grade Level: 3-4

Title: Technical Writing and Illustrating

Definition: Technical writing and illustration consists of detailed, written description of a product with a photograph or technical sketch of the product.

Objectives: As a result of the learning experiences the students should be able to demonstrate ability to describe in detail an engineered product and to be able to "illustrate" the product in use by the consumer on an 8½" X 11" piece of paper.

Activities:

1. Make a list of the important features, dimensions and innovations which are pertinent in describing the paraffin candle the children have designed. After the child has a verbal picture of the product, he is to draw an illustration of the manufactured product (candle) being used by the consumer.
2. Other ideas might include: Occasion cards made with potato prints, polyester plastic paper weights, styrofoam Christmas ornaments, etc..

Teaching Procedure:

1. Discuss the historical and modern use of the candle. Elaborate on how the candle is manufactured today and in the past.
2. Show the children a candle you have produced and let them describe in detail the function, motif, innovation, color, dimensions or other verbalizations to describe the candle.
3. Let each child produce an illustration on paper which he feels might best describe the product when used by the consumer. Indicate how his illustration might help to "sell" the product.

Relationships:

1. Mathematics: Measuring the candle dimensions.
2. Language Arts: Writing.
3. Fine Arts and Drafting: Illustrating the project.

Tools and Materials:

8½" x 11" paper and drawing materials.

Bibliography:

Making Honeycomb Candles, Kap-Pak Products, Chicago, Illinois, 1960.

Dubin, Sidney, Making Honeycomb Candles, Sidney Dubin, 1958, (sold by Zim's Hobbies, Salt Lake City, Utah)

MANUFACTURING

Assignment: 18 Grade Level: 3-4

Title: Operating Quality Control System

Definition: Quality control systems consists of inspection during and after production, to determine if the product meets specifications.

Objectives: As a result of the learning experiences the students should be able to produce a functional, colored, paraffin candle of uniform color and texture and insure that specifications are being met.

Activities:

1. Students are to produce a functional, paraffin candle of uniform color and texture. On the assembly line basis, scent and special decorations are optional.
2. Other quality control activities might include: occasion card printing, Christmas tree ornaments, paper weights, etc..

Teaching Procedure:

1. Discuss problems in the production of the paraffin candle and what constitutes a good quality candle.
2. Show children a manufactured candle and indicate how it compares with others in quality, color and texture.
3. On a production basis, produce a paraffin candle.
4. Select several children to make certain the candles being produced meet specifications. Remanufacture those candles that to not meet standards.

Relationships:

1. Chemistry: The study of the manufacture of wax.
2. Social Studies: The history and production of the paraffin candle.
3. Mathematics: The measurements of standards and specifications.

Tools and Materials:

Heat source for hot wax, (old coffee pot) cold wax might be used. Wax, perfume, wick, mold, color, glitter or other decorations.

Bibliography:

Making Honeycomb Candles, Kap-Pak Products, Chicago, Illinois, 1960.

Dubin, Sidney, Making Honeycomb Candles, Sidney Dubin, 1958,(sold by Zim's Hobbies, Salt Lake City, Utah.)

MANUFACTURING

Assignment: 19 Grade Level: 3-4

Title: Designing and Engineering the Plant and Supplying Equipment and Materials.

Definition: Designing the plant consists of initiating and developing an idea of general factory layout. Engineering the plant consists of planning the production line for a better product at a lower cost.

Objectives: As a result of the learning experiences the students should be able to design workshop operation spaces, determine tools, machines, materials, and skills necessary to manufacture a product, to design an item to be manufactured and to estimate costs and profits in engineering the production of a manufactured article.

Activities:

1. To design and engineer a weather van factory.
2. To design and engineer a puppet factory.
3. To design and engineer a kite factory.

Teaching Procedure:

1. To design a weather van factory, discuss the assembly line and make a drawing of work-shop space and breakdown of operations.
2. Estimate the materials needed, the cost, market and profit.
3. Draw a model design of a base, post and pointer for a weather van on the chalkboard.
4. Have the children make two original sketches and choose the best one.
5. Plan on paper profitable production organization for the manufacture of this proposed weather vane.

Relationships:

1. Science: A weather instrument.
2. Mathematics: Estimating expenses and profits
3. Drafting: Architectural floor plans.

Tools and Materials:

8 1/2" X 11" graph paper, ruler, compass. Illustrations of factory layout and weather vane.

Bibliography:

Gerbracht and Babcock, Industrial Arts K-6, Wm. C. Brown Co., Dubuque, Iowa: 1959, pp. 89-94, 130.

Bailey, Thomas, Industrial Arts in Florida, State Department of Education, Tallahassee, Florida: 1958, p. 15.

Moore and Kibbey, Manufacturing Materials and Processes, Richard D. Irwin, Inc., Homewood, Illinois, 1965, pp. 1-10, 120-125, 452-453.

MANUFACTURING

Assignment: 20 Grade Level: 3-4

Title: Employment and Occupations; Hiring and Training Manufacturing Personnel Technology.

Definition: Employment is a job in the working force. Occupations are skills or services exchanged for wages. Manufacturing personnel technology is the practice management follows with regard to hiring suitable employees and training them.

Objectives: As a result of the learning experiences the students should be able to work as an employer, employee, a foreman, and to train others. To complete a satisfactory job and learn new methods and skills.

Activities:

1. Develop a manager and clerk situation in the classroom grocery corner.
2. Develop a group transportation exhibit with directors and helpers.
3. Develop a library loan center in the classroom with a librarian and assistants.
4. Develop a dairy unit activity involving superintendent and workers.

Teaching Procedure:

A transportation exhibit was decided upon as a team project. Those skilled in crafts became managers with assistants and helpers. The Plaster Relief Team mixed plaster and water, one part of water to two parts of plaster, and molded it to form in the metal sand box. The Vehicle Team was divided into Water, Air and Land Transportation Groups. They put their box models together, laid pans for water, sep up buildings and tracks and provided signs, for their section.

Relationships:

1. Social Studies: Our Home Region, map, display, transportation in our locality.
2. Mathematics: Computing section planning, job divisions, numbers of vehicles.
3. Language Arts. Reading local history background references.

Tools and Materials:

Model vehicles in box form, erector sets, stencils in plywood, tracks of styrofoam, aluminum pans for water, saws, nails, hammers, bolts, screws, glue, knives, scissors, mixing pan, metal sand box table or display table, plaster and water.

Bibliography:

Husbands, Kenneth, Teaching Elementary School Subjects, Ronald Press Co., New York City, N.Y.: 1961, pp. 331, 369.

Haws, Robert W. and Schaefer, Carl, Manufacturing in the School Shop, American Technical Society, Chicago, Illinois: 1960, pp. 12-13, 36-38.

MANUFACTURING

Assignment: 21 Grade Level: 3-4

Title: Harnessing Energy from Nature. Securing Reproducible Raw Materials. Extracting Raw Materials.

Definition: In harnessing energy from nature, natural fuels, water and nuclear energy are converted into electricity to power machines. Reproducible raw materials are those genetically reproduced while extracted ones are drawn out from the earth like stone and ores.

Objectives: As a result of the learning experiences the students should be able to use reproducible and extracted raw materials; use human, wind, and electric power, in at least one application.

Activities:

1. Make posters and charts of raw materials.
2. Weave cotton and nylon yarn and note differences. Make a pot holder.
3. Make a windmill, kite or glider. Use a flashlight battery and motor for windmill propeller.

Teaching Procedure:

In weaving a yarn potholder the teacher will:

1. Note that cotton yarn comes from a plant while nylon is synthetic produced from a mineral.
2. Use an 8" square board and a ½" from the edge set a border of nails to stand ½" high and ½" apart. Loop yarn from one nail to the opposite side to make a warp.
3. Make a weft do the same on the other side of the square but use a hook to weave under and over the warp.
4. Finish by crocheting the end loops off the nail and through the next loop until complete.

Relationships:

1. Social Studies: Clothing materials
2. Reading: Story of Cotton, Nylon, and Weaving.
3. Mathematics: Measurement and counting.
4. Spelling: Warp, weft, loom, genetic, extracted and synthetic.

Tools and Materials:

Nylong or cotton yar, (large) C0 Crocket hook, 8" square board, 1¼ wire finishing nails, hammer, hand drill, 1/16" bit.

Bibliography:

Grimm, Gretchen, Basic Crafts, Burgess Publishing Co., Minneapolis, Minn., 1966, pp. 87-96.

Colorado Occupational Theraphy Assoc., At Your Fingertips, Smith-Brooks Printing Co., Denver, Colorado, 1954, pp. 165, 187.

Newkirk, Louis V., Integrated Hand Work for Elementary Schools, 1940, pp. 145-176.

MANUFACTURING

Assignment: 22 Grade Level: 3-4

Title: Manufacturing Production Technology

Definition: Manufacturing production technology consists of converting some raw material which may be genetic or extractive into a usable product.

Objectives: As a result of the learning experiences the students should be able to differentiate between finished and unfinished products; be familiar with the genetic and extractive meaning of the word as related to manufacturing; list raw materials as necessary items in producing two finished products.

Activities:

1. Construct a sailboat.
2. Bake a cake.
3. Make a relief map showing location of principal products.

Teaching Procedure:

1. Study the New York State map. (or any map of your choice)
2. Draw outlines of map on heavy cardboard, plywood or masonite.
3. Go over the lines with India ink or black poster paint.
4. Indicate where rivers, railways will be.
5. Apply mixture to most of the map working from the outside in. Push mixture into mountains, and make indentations for irvers, etc., with the fingers or a stick.
6. Paint the completed map when dry with poster paints and add a coat of clear shellac.
7. Flour and water mixture: mix 1 cup flour, ½ cup salt, and enough water to make a clay. This mixture can be cut with a knife, rolled and kneaded.

Relationships:

1. Social Studies: Study of principal products and their locations in the state.
2. Art: Use of paints.

Tools and Materials:

Heavy cardboard, plywood, masonite, flour and water mixture, clear shellac, colored poster paints.

Bibliography:

-------------, *Crafts, the Easy Way*, Graff Publications, Inc., Chicago, 1966.

MANUFACTURING

Assignment: 23

Grade Level: 3-4

Title: Preparing Raw Materials

Definition: The preparation of raw material from its natural condition to a state where it can be used in the manufacture of goods.

Objectives: As a result of the learning experiences the students should be able to understand that raw materials are the basic elements in a finished product; prepare the raw materials for Hors d'oeuvre centerpiece.

Activities:

1. To arrange an hors d'oeuvre centerpiece.
2. To collect and prepare materials for this centerpiece.

Teaching Procedure:

1. Background study of raw materials.
2. Arrange autumn leaves around a large squash.
3. Place a bit-sized appetizers on colored wooden toothpicks.
4. Attach the toothpicks to the squash.

Relationships:

1. Art: Use of colors; design and arrangement.
2. Health: Sanitary conditions in working with food.
3. Science: The effect of fall weather on nature.

Tools and Materials:

Toothpicks, squash, food coloring, leaves, flavored crackers, fit size cheese.

Bibliography:

Kitchen Cupboard Handicrafts, Ka-Pak Products, Chicago, 1963.

MANUFACTURING

Assignment: 24 Grade Level: 3-4

Title: Establishing Safety Program

Definition: Establishing Safety Program is a conscious and organized program of developing conditions and precautions.

Objectives: As a result of the learning experiences the students should be able to identify color code pattern that is used to indicate dangerous conditions; identify safety precautions for: fire drill, accident, crossing street, operating equipment.

Activities:

To make billboard signs of various shapes denoting danger and caution signs.

Teaching Procedure:

1. Give background on the significance of color in a safety program.
2. Explain the shape of signs on the road.
3. Cut pieces of wood or heavy cardboard into given shapes as rectangle, square, diamond.
4. Print letters and words as instructed, example, CAUTION, DANGER.
5. Post signs in danger areas.

Relationships:

1. Language Arts: Reading and recognition of signs - and printing of words.
2. Mathematics: Study of geometrical shapes.
3. Safety: Study of safety rules.

Tools and Materials:

Cardboard, ruler, saw, magic markers, wood, paint.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, The Bruce Publishing Co., Milwaukee, Wisconsin, 1959.

Assignment: 25 Grade Level: 3-4

Title: Organized Labor and Collective Bargaining, Working, Advancing and Retiring

Definition: Organized labor and collective bargaining is the study of the growth of labor as an important part of the American Industrial Society, including a study of the individual worker's needs; his working conditions, advancement opportunities and retirement.

Objectives: As a result of the learning experiences the students should be able to define the following terms; organized labor, collective bargaining, working, advancing, and retiring.

Activities:

1. Have the students make cardboard models of steel mills, factories, coal mines and ship building plants.
2. Organize the class into a simulated labor organization and use "role playing" as a means of settling labor disputes in the collective bargaining process.

Teaching Procedure:

1. Discuss the history of organized labor in the United States and point out how the union is organized and the collective bargaining process resolves labor disputes.
2. Design and construct a simple flow chart to help the class in organizing their own labor or professional group.

Relationships:

1. Social Studies: Labor movement in the United States.
2. English: Spelling and vocabulary terms.

Tools and Materials:

Pencils, cardboard, glue, paper, and scissors.

Bibliography:

Platts, Mary E., Create, Education Service, Inc., Benton Harbor, Michigan, 1966, pp. 115-143.

Assignment: 26 Grade Level: 3-4

Title: Making Components or Finished Products

Definition: Making components or finished products is the process or processes of designing, drawing, manufacturing, assembling, and inspecting parts or finished products.

Objectives: As a result of the learning experiences the students should be able to design a simple letter holder; make a finished product using wood as a basic material; identify as least three common finishing materials; and identify at least six common hand tools.

Activities:

1. Students are to select, design, and make a letter holder out of wood or any other suitable material.
2. Have the students make a bill of materials and a step-by-step procedure for the letter holder.
3. Divide the class into groups of five each and have each group select, design and make a model rocket to be used in science.

Teaching Procedure:

1. Work through a sample design on the blackboard and emphasize the elements of good design.
2. Demonstrate the use and care of common hand tools.
3. Demonstrate the use and care of finishing materials.
4. Discuss the bill of materials and procedure and have the class work through one with your help.

Relationships:

1. English: Spelling and vocabulary words.
2. Mathematics: Fractions and measurement.

Tools and Materials:

Hammers, saws, planes, files, nails, glue, finishing material, drills, clamps, and abrasive paper.

Bibliography:

Platts, Mary E., Create, Educational Service, Inc., Benton Harbor, Michigan, 1966, pp. 123-138.

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Company, Dubuque, Iowa, 1966, pp. 40-59.

MANUFACTURING

Assignment: 27 Grade Level: 3-4

Title: Material Removing Practices

Definition: Material removing practices are the processes of cutting and abrading materials.

Objectives: As a result of the learning experiences the students should be able to identify four common chip removing tools; use simple hand tools in sawing out and shaping a design; and apply finishing materials.

Activities:

1. Have the students design and construct a toy truck using soft wood as the material.
2. Make sketches of animals and trace their design on soap. The students should then cut out their design with dull knives and polish.
3. Have the students make a bulletin board display on the application of chip removing, smoothing, shearing, and abrading.

Teaching Procedure:

1. Demonstrate a sample toy car design on the chalkboard.
2. Demonstrate the use and care of common tools.
3. Demonstrate the use and care and application of finishing materials.

Relationships:

1. Mathematics: Measuring devices
2. English: Spelling and vocabulary terms

Tools and Materials:

Hammers, files, saws, planes, abrasive paper and finishing materials.

Bibliography:

Platts, Mary E., Create, Educational Service, Inc., Benton Harbor, Michigan, 1966, pp. 121-134.

Assignment: 28 Grade Level: 3-4

Title: Material Removal By Non-Traditional Processes

Definition: Material removal is the separation of varying amounts of material from any substance. Non-traditional refers to such practices of cutting and abrading as laser beam, ultrasonic sound, etc..

Objectives: As a result of the learning experiences the students should be able to identify processes that are non-traditional.

Activities:

1. Visit a factory where non-traditional practices of material removal are used.
2. Demonstrate ultrasonic sound in the classroom (perhaps a technician from a local industry can bring a small unit to the classroom).
3. Show a movie illustrating the use of a laser beam or ultrasonic sound.

Teaching Procedure:

1. Review previous lesson (traditional methods of cutting and abrading).
2. Show a film illustrating at least one kind of non-traditional material removal.
3. Discuss the various applications and advantages of the non-traditional methods shown.

Relationships:

1. Health Science: Ultrasonic cleaning of teeth.
2. Social Studies: Communications, use of laser beam.

Tools and Materials:

Movie projector, screen, and film (contact local industry for film).

Bibliography:

Mavena and Zafforoni, Today's Basic Science, Harper Row, New York, New York, 1963.

Carroll, John Millar, The Story of the Laser, Dutton Press, New York, New York, 1964, illus..

MANUFACTURING

Assignment: 29

Grade Level: 3-4

Title: Material Forming Practices

Definition: Material forming is the process by which a material is molded, bent, cast, compacted or otherwise changed to a new shape.

Objectives: As a result of the learning experiences the students should be able to mold a lump of clay into a useful piece of pottery; distinguish between pinch pots, coil forming and slab forming; and distinguish between molding, bending and compacting.

Activities:

1. Make useful pieces of pottery
2. Cast plaster of paris.
3. Do wire sculpture.

Teaching Procedure:

1. Discuss the process of molding a plastic material. Show how clay can be molded, bent (coil forming) and compacted (slab forming).
2. Demonstrate several ways of forming clay into pottery (ie. pinch pots, coil forming, and slab forming).
3. After students have completed their projects, discuss the modern ceramic industry and the techniques used in forming clay that might be different from those experienced in this project (ie. air pressure molding etc.).

Relationships:

1. Social Studies: How American Indians and other primitive people utilized clay. Occupations involved in the ceramic industry.

Tools and Materials:

One medium size lump of clay for each child.

Bibliography:

Wankelman, Richards and Wigg, Arts and Crafts for the Elementary Teacher, W. C. Brown Co., Dubuque, Iowa, 1956, pp. 92-95.

MANUFACTURING

Assignment: 30

Grade Level: 3-4

Title: Hot and Cold Working

Definition: Material working practices are performed under two processes. Hot working is the process by which heat is necessary in the shaping of material. Cold working refers to working materials at room temperature.

Objectives: As a result of the learning experiences the students should be able to differentiate between hot and cold working; be able to produce a finished product by using one of the methods.

Activities:

1. Hammer a thin disc of aluminium into a shape suitable for use as an ash tray.
2. Bend plastic stock into a bracelet using heat in the forming process.
3. Dip candles in hot paraffin.
4. Roll candles using thin sheets of wax.

Teaching Procedure:

1. Divide class into two groups; one to dip candles, the other to roll candles.
2. Demonstrate candle dipping and candle rolling.
3. After project is completed discuss hot and cold forming of materials as it relates to manufacturing.

Relationships:

1. Social Studies:
    - a. Pioneer Life - candle making.
    - b. Christmas decorations and customs around the world.
    - c. Food, clothing and shelter.

Tools and Materials:

Double boiler or other suitable heat source, paraffin to be melted, deep container (at least 6") to hold liquid paraffin, wick material, thin sheets of wax to be rolled, cut into 6" squares.

Bibliography:

Newkirk, Louis V., Integrated Handwork for the Elementary Schools, Silver Burdett Co., New York, New York, 1940, p. 54.

Assignment: 31

Grade Level: 3-4

Title: Casting

Definition: Casting is the reproduction of an original through the introduction of a viscous material into a mold where the viscous material is solidified into the shape of the original.

Objectives: As a result of the learning experiences the students should be able to form a reproduction of an original; cast a plaster of paris object; and decorate or otherwise finish the cast object.

Activities:

1. Cast plaster of paris objects.
2. Cast lead soldiers.
3. Cast paraffin objects.

Teaching Procedure:

1. Form a mold by pressing an object into wet sand or by scopping out a depression in the sand.
2. Pour plaster of paris into a mold and allow to set.
3. Remove from mold and decorate cast object with paints or otherwise finish it.
4. At the conclusion of the project discuss casting as it applies to the steel, plastic, rubber and other industries.

Relationships:

1. Science: Change of state of materials, shrinkage.
2. Mathematics: Measurements.

Tools and Materials:

One container for each child to hold sand mold (ie. shoe boxes or milk cartons), sand; enough to fill containers half full, plaster of paris, tempera paints.

Bibliography:

Wankelman, Richards and Wigg, Arts and Crafts for the Elementary Teacher, W. C. Brown Co., Dubuque, Iowa, 1956, p. 114.

Newkirk, Louis V., Integrated Handwork for Elementary Schools, Silver Burdett Co., New York, New York, 1940, p. 54.

MANUFACTURING

Assignment: 32

Grade Level: 3-4

Title: Combining Materials Into Products

Definition: The process of combining materials into products is the bringing together of various substances to form a more complex items.

Objectives: As a result of the learning experiences, the student should be able to combine materials to form a hot pad, combine powdered paints with water to form a liquid and to glue nut shells and sea shells on cardboard or wood.

Activities:

1. Weave different materials (wool, cotton, plastic) together to form a hot pad.
2. Combine powdered tempera paints with water to form a liquid.
3. Glue nut shells and sea shells, or macaroni, to a cardboard circular backing.

Teaching Procedure:

1. Elaborate on the definition of combining materials into products.
2. Point out how the sequence of steps pertains to any project where there is a combining of materials to produce a product, e.g. the planning, the gathering of materials, the design, the skills, and the finished product.
3. Demonstrate the proper useage of the tools involved.
4. Emphasize that care and time are essential for a pleasing or workable end product.

Relationships:

1. Science: Study the source of the materials involved.
2. Art: Developing the shape; selecting the design or color, and making the arrangement.
3. Social Studies: Studying products, how they are made, and what is involved in their manufacture.
4. Reading: How to do it books; directions.
5. Mathematics: Measuring the materials and combining proportions.

Tools and Materials:

Glue, sea and nut shells, macaroni, circular backing: wood or cardboard, Tempera, water, measuring utinsile, loop loom, needle, thread, wool loops, cotton loops, plastic loops.

Bibliography:

Harrison, O. S., Industrial Arts and Handcraft Activities, Burgess Publishing Co., Minneapolis, 1961, p. 60 (glueing)

The Colorado Occupational Therapy Assoc., At Your Fingertips, Smith-Brooks Printing Co., Denver, Colorado, 1954, pp. 165-190 (weaving)

MANUFACTURING

Assignment: 33

Grade Level: 3-4

Title: Coating Surfaces

Definition: Coating surfaces is the method of perserving, decorating, or adding properties the basic material does not possess. Some widely used coating processes are painting, enamaling, plating, and laminating.

Objectives: As a result of the learning experiences, the student should be able to decorate objects he has constructed with spray paint or protect a picture he has painted with spray lacquer or liquid lacquer.

Activities:

1. Apply spray paint to at least one object.
2. Apply spray lacquer to a picture.
3. Apply liquid lacquer to a picture.

Teaching Procedure:

1. Elaborate slightly on the definition of coating surfaces.
2. Explain the reasons various materials are surface coated and the sequential steps, if any.
3. Demonstrate the proper application of the paint and how to handle the various tools.
4. Explain the necessity for a drying period.
5. Point out how and why the various painting tools are cleaned after using.

Relationships:

1. Reading: Read directions, recipes, and articles about coating surfaces.
2. Science: Study the materials and sources of coating materials.
3. Social Studies: Locate the parts of the country or countries where the material is found.
4. Art: Develop skill in decorating.

Tools and Materials:

Objects to be decorated, painted, or protected, spray paint, spray lacquer, liquid lacquer, brush, thinners, newspapers.

Bibliography:

Childcraft, The How and Why Library, Vol. 9 Field Enterprise, 1964.

The Colorado Occupational Therapy Assoc., At Your Fingertips, Smith-Brooks, Denver, Colorado, 1954, pp. 291.

MANUFACTURING

Assignment: 34 Grade Level: 3-4

Title: Assembling Components into Sub-assemblies and Finished Products

Definition: Assembling components into sub-assemblies and finished products is a process where two or more pieces are brought together or assembled using various technologies of joining.

Objectives: As a result of the learning experiences the students should be able to define component parts; identify two joining techniques and be able to perform them.

Activities:

1. Build a bird feeder.
2. Build a letter holder.
3. Make a mosaic picture from pieces of ceramic materials.

Teaching Procedure:

First Day
1. Divide the class into three groups - management, (to determine consumer demand) design and engineering, (to design project) and production planning (to set up assembly line).
2. Give groups instructions on each of their functions and help them start planning.

Second Day
Groups continue planning, communicate with each other and finalize plans for production on third day.

Third Day
1. Prepare jigs before class time.
2. Assign all children to stations on assembly line and begin production.

Fourth Day -- continue production
Fifth Day -- (See next lesson - Preparing for Distribution)

Relationships:

1. Social Studies: Wild life, conservation, American Industry, mass production.
2. Mathematics: Estimate material costs, labor costs, material lengths, etc..

Tools and Materials:

Lumber, nails, paint (quantity based on the number of finished products to be produced), saws, hammers, drills, paint brushes (quantity determined by number of stations on assembly line).

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Co., Dubuque, Iowa, 1966, pp. 19-22.

MANUFACTURING

Assignment: 35 Grade Level: 3-4

Title: Preparing for Distribution

Definition: Preparation for distribution includes those processes that clearly mark, label, or identify, count, bag, wrap, or otherwise package a product for shipment.

Objectives: As a result of the learning experiences the students should be able to define packaging; perform at least one type of packaging operation; and identify three various types of packaging as seen in a grocery store.

Activities:

1. Package an item that has been mass produced (see previous lesson).
2. Package a gift that has been prepared for Christmas, Father's Day, or Mother's Day.
3. Package items that have been prepared for a children's home or a hospital.

Teaching Procedure:

1. Discuss the various ways industry packages manufactured items(i.e., grocery store).
2. Discuss ways the bird feeder (produced in previous lesson) might be packaged.
3. Select a method suggested by the students (i.e., plastic bags).
4. Have children label bags as to contents, type,, color, etc.

Relationships:

Social Studies: Food, clothing, shelter (packaging, grocery store, etc.).

Tools and Materials:

Packaging materials, felt tip pens or other appropriate materials to mark bags.

Bibliography:

Gilbert, Harold G., Children Study American Industry, Wm. C. Brown Publishers, Dubuque, Iowa, 1966, pp. 19-22.

MANUFACTURING

Assignment: 36 Grade Level: 3-4

Title: Servicing Manufactured Products

Definition: Servicing consists of installing, maintaining, repairing or altering a manufactured product after it leaves the point of manufacture.

Objectives: As a result of the learning experiences the students should be able to define servicing as it applies to the maintaining of two of their bicycles, wagons, or other toys; perform two simple servicing operations to their toys.

Activities:

1. Have children bring in toys to be serviced.
2. Collect toys for an orphanage and repair them.

Teaching Procedure:

1. Have children bring in bicycles, wagons, or other toys. Each child should have at least one toy to service.
2. Discuss and demonstrate simple servicing operations, i.e. oiling, tightening,loose bolts and screws, adjusting bicycle chains etc.
3. Have children perform necessary operations on their toy.
4. Discuss the importance of proper servicing to long useful life of manufactured product.

Relationships:

1. Reading: How to Do It Books.
2. Science: Effects of friction and wear.
3. Social Studies: How important servicing is to various aspects of society.

Tools and Materials:

Screw drivers, wrenches, pliers, hammers, oil can, bolts, nuts and screws of various sizes.

Bibliography:

Gerbracht, Carl and Babcock, Robert J., Industrial Arts for Grades K-6, The Bruce Publishing Co., Milwaukee, Wisconsin, Chapter 2.